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ACTIVITIES MANUAL

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HAZARDOUS MATERIALS OPERATING SITE PRACTICES

FEDERAL EMERGENCY MANAGEMENT AGENCY
UNITED STATES FIRE ADMINISTRATION
NATIONAL FIRE ACADEMY

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INDIVIDUAL ACTIVITIES

Activity 2.1

Physical Properties

Purpose

To familiarize you with reference libraries and their use, the ability to identify physical properties of a specified substance, and to practice interpretation of physical properties.

Directions

1. Each team will work on the same substance for this activity. That substance is ethylene oxide.

2. Each team is to identify and complete the physical property data found on the Product Data Sheets. The team should use the sheets as a tool and not let them control the activity.

3. Each team will have about 15 minutes to find and document the information, and about 15 minutes to review its findings.

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Product Data Sheet --- Science Group

Incident Number ___/___/___/___ Preparer: _____
year/month/day/number
Science Officer: _____
Additional Science Personnel: _____
_____

Responders must complete a sheet for each product involved.

PRODUCT

Name: _____

Alternate Name(s): _____

Chemical Formula: _____

[ ] Structural _____

[ ] Empirical _____

IDENTIFICATION NUMBERS

UN Class/Division _____ UN Identification _____ CAS _____

STCC _____ EPA Registration _____ EPA Establishment _____

NFPA 704 DESIGNATION

[ ] Health _____ [ ] Flammability _____

[ ] Reactivity _____ [ ] Special Hazards _____

HAZARD COMMUNICATIONS/HMIS DESIGNATION

[ ] Health _____ [ ] Flammability _____

[ ] Reactivity _____ [ ] Special Hazards _____

RELEASE STATUS

[ ] No release [ ] Ongoing release [ ] Complete release

[ ] Anticipated release [ ] Unknown

_____ **Preceding page blank** _____

QUANTITY

Reportable quantity (RQ) _____ Released quantity _____

Available for release _____

FLAMMABILITY PROPERTIES

Reference Sources	1. Pg.	2. Pg.	3. Pg.
LEL			
UEL			
Flash point			
Ignition temperature			
Decomposition (State yes or no)			
Explosion potential			

PHYSICAL PROPERTIES

Reference Sources	1. Pg.	2. Pg.	3. Pg.
Odor			
Odor threshold			
Color			
Physical state			
Physical form [ ] Particulate [ ] Granule [ ] Slurry/gel [ ] Cryogenic [ ] Liquefied compressed gas			
Boiling and condensation point			
Freezing and melting point			
Sublimation (State yes or no)			
Specific gravity			
Vapor density			
Vapor pressure			
Reid vapor pressure			
Water solubility			

REACTIVITY PROPERTIES

Reference Sources	1. Pg.	2. Pg.	3. Pg.
Oxydizer (State yes or no)			
Pyrophoric (State yes or no)			
Corrosive (State yes or no)			
pH anticipated			
MSST			
SADT			
Explosion potential (State yes or no)			
Polymerization potential. (State yes or no)			
Radioactivity [ ] Alpha [ ] Beta [ ] Gamma [ ] Other			

TOXICITY

Reference Sources	1. Pg.	2. Pg.	3. Pg.
TLV			
PEL			
IDLH			
STEL			
Ceiling			
LD_{50}			
LC_{50}			
Exposure routes (i) Inhalation (d) Ingestion (s) Skin abs./cont.			
Carcinogen (State yes or no)			
Mutagen (State yes or no)			
Teratogen (State yes or no)			
Target organs			
Symptoms of exposure			

First aid			

Reference Sources	1. Pg.	2. Pg.	3. Pg.
Compatibilities			
PPE			
Substances			
Incompatibilities			
PPE			
Substances			

PROTECTION DISTANCES

Isolation _____

Small quantity _____

Large quantity _____

Evacuation _____

Small quantity _____

Large quantity _____

MONITORING DATA

Anticipated atmosphere hazards

[ ] Oxidizer
[ ] Corrosive
[ ] Toxic
[ ] Oxygen deficient
[ ] Radiation
[ ] Oxygen enriched
[ ] Flammable

Relative Response Conversion Factors: _____
Substance Ionization Potential: _____ e.V.

MONITORING FACTORS

Relative response	R.R. factor	Source:
Ionization potential	I.P.:	Source:
Action levels (based on relative response)	10% LEL with R.R. factor	Source:
Minimum O_2 function level	20% LEL with R.R. factor	Source:

INSTRUMENTATION

Instrument	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time
CGI							
$\%O_2$							
pH paper							
Colorimetric tubes (name)							
Tube 1							
Tube 2							
Tube 3							
Dip stick (name)							
Radiation (specify)							
PID							
FID							

Activity 2.2

Chemical Properties

Purpose

This group activity is a continuation of Activity 2.1, and is designed to further familiarize you with the reference libraries and their use, the ability to identify physical properties of a specified substance, and practice interpretation of chemical properties.

Directions

1. Each team will work on the same substance for this activity. That substance is ethylene oxide.

2. Each team is to identify and complete the chemical property data found on the Product Data Sheets. The team should use the sheets as a tool and not let them control the activity.

3. Each team will have 15 minutes to find and document the information, and about 15 minutes to review its findings.

Activity 2.3

Properties of Potential Terrorism Agents

Purpose

To familiarize you with potential terrorism agents.

Directions

1. Each team will be assigned one of the following four weaponry agents:
   a. Sarin.
   b. Anthrax.
   c. Ricin.
   d. PETN.
2. Each team will have 15 minutes to find and document the information, and about 15 minutes to review its findings.

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Activity 2.4

Environmental Information

Purpose

To familiarize you with the Environmental Data Sheets.

Directions

1. Each team in the class works on the same scenario for this activity.

2. Each team will have about 5 minutes to become familiar with the Environmental Data Sheets and about 20 minutes to read the scenario and document the information.

3. After the allotted time, each team will have about 5 minutes to go over the sheets.

Scenario

It is a warm day in May, approximately 1200 hours. A report comes in that a hazardous materials transport is emitting a small vapor cloud. The driver has pulled off the highway. Humidity is 72 percent, and the wind is from the west at 4 mph.

The driver had made four pickups of the following products, one at each stop: ammonium sulfate, copper sulfate, sulfuric acid, and wastewater. The first three products total 1,200 gallons and there are 2,000 gallons of wastewater.

The trailer is a 4-month-old MC312 (SS). Recent tests and inspections have indicated that it is in good condition.

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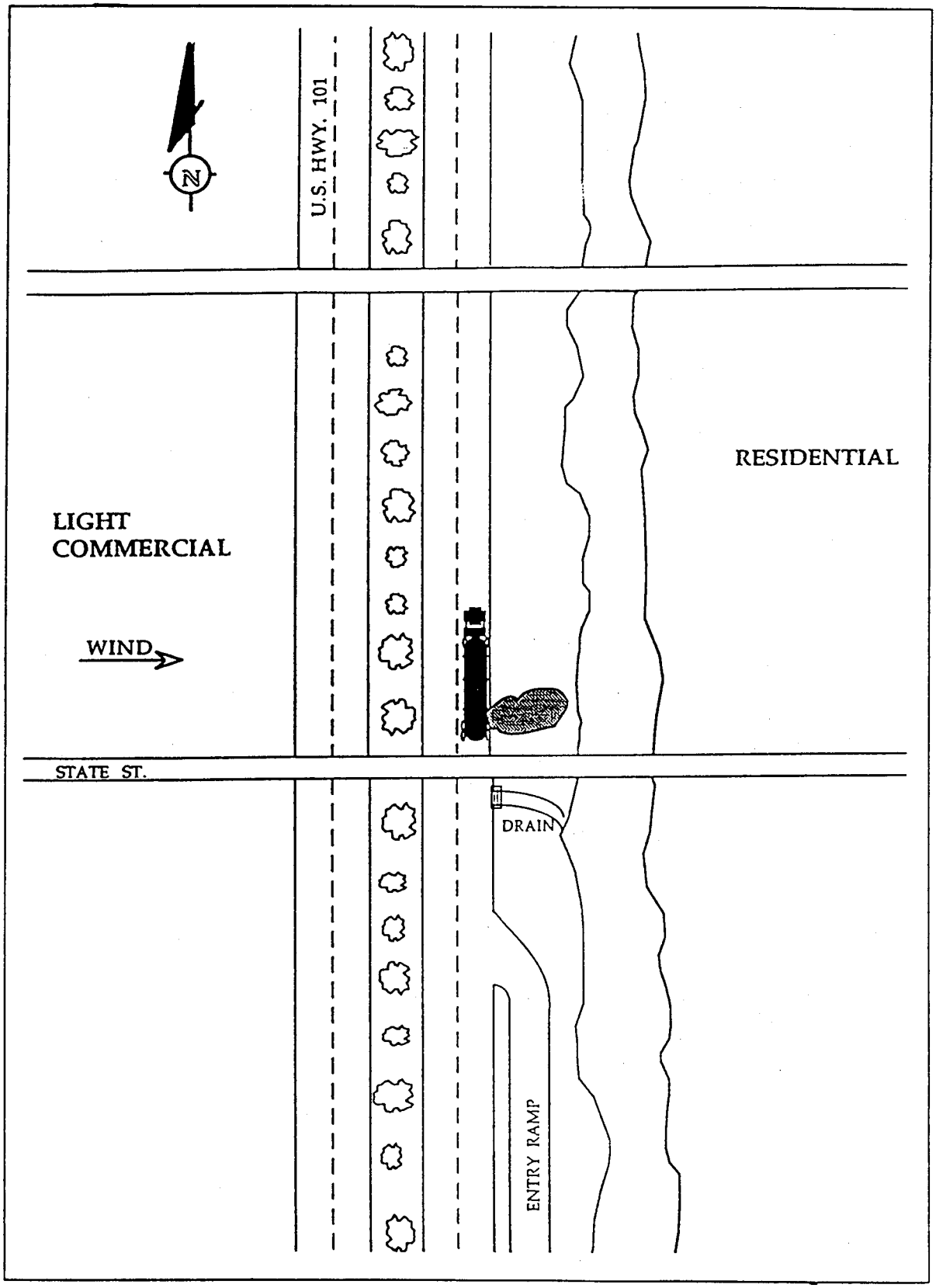
STUDENT ACTIVITY WORKSHEET



ENVIRONMENTAL DATA SHEETS

BASIC INCIDENT INFORMATION

Location: _____
_____
_____

Occupancy or transportation type: _____

Date: _____ Initial time (in military hours): _____

Updated times: _____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Situation Status (upon arrival)

Spill (release): [ ] yes [ ] no
Contaminant: [ ] solid [ ] liquid [ ] gas
Size of contaminated area: _____
Fire present: [ ] yes [ ] no
Fuel: [ ] product [ ] container [ ] exposures
Explosion: [ ] yes [ ] no
Status: [ ] ongoing [ ] occurred
Other Information: _____
_____
_____

CONFINEMENT

[ ] Within a structure [ ] Outside
Devices: [ ] dikes [ ] retention pond [ ] detention pond
[ ] retention tanks
[ ] other _____
_____

CONDUITS

[ ] drainage ditch/swale [ ] storm sewers [ ] gullies

EXPOSURES

Population types/numbers

[ ] involved/estimated no. _____ [ ] contaminated/estimated no. _____
[ ] injured/estimated no. _____ [ ] trapped/estimated no. _____

Populations/occupancies endangered

[ ] residential [ ] commercial [ ] mercantile
[ ] industrial [ ] mixed [ ] hospital
[ ] nursing home [ ] school [ ] prison
[ ] transportation corridor

Other: _____
_____

STRUCTURE and PROPERTY TYPES

Man-made

[ ] structures [ ] processes [ ] containers
[ ] vehicles [ ] water wells [ ] sewage treatment
[ ] closed water storage/treatment
[ ] food production/handling facilities
Other: _____
_____

Natural

Bodies of water

[ ] stream [ ] river [ ] pond [ ] lake
[ ] open reservoir [ ] wetlands [ ] estuary
[ ] ground water

Surfaces

[ ] sand [ ] gravel [ ] clay [ ] compacted ground
[ ] asphalt [ ] concrete

Organisms

Animal

[ ] mammals [ ] fish [ ] birds
[ ] endangered species [ ] farm animals
[ ] dead animals/plants

Plant

[ ] agricultural [ ] aquatic

WEATHER

Responders should take meteorological readings every fifteen minutes. In critical situations, they may need readings at more frequent intervals. In non-critical situations, the intervals may be longer.

On-scene Weather Station

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

NOAA Information

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

Other Source: _____

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

Activity 2.5

Hazardous Materials Table and Shipping Papers

Purpose

To provide experience in using Part 172 Subpart C of 49 CFR, Shipping Papers.

Directions

Using the material contained in the reading assignment and the Hazardous Materials Table (HMT), answer the following questions:

1. Alcohol is a proper shipping name.

   a. True
   b. False

2. Anhydrous hydrofluoric acid is a proper shipping name.

   a. True
   b. False

3. The proper shipping name, hazard class, and identification number for tars, liquid, with a flashpoint of 150°F (65.5°C), is

   a. asphalt, 3, NA1999, III.
   b. "HOT" asphalt, cut back, 3, UN1999, PGII.
   c. asphalt cut back, combustible liquid, UN1999.
   d. "HOT" asphalt, cut back, combustible liquid, UN1999, PG II.
   e. Tars, liquid combustible liquid, NA1998.

4. A 7,000-gallon cargo tank load of amyl acetate is regulated as

   a. an ORM-E.
   b. a hazardous material only.
   c. a hazardous substance only.
   d. both a hazardous material and a hazardous substance.

5. The hazard class and identification number for arsenic trichloride is _____.

6. The identification number for barium styphnate is _____.

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7. Tin chloride and stannic chloride, anhydrous, are both proper shipping names.

   a. True
   b. False

8. Iodine chloride is a proper shipping name and may be used in place of iodine monochloride.

   a. True
   b. False

9. Which, if any, of the following is a proper shipping description for a cargo tank load (6,000 gallons) of propionaldehyde?

   a. 3, propionaldehyde UN1275, 6,000 gal. II.
   b. Propionaldehyde 3, UN1275, 6,000 gal. PGII.
   c. Propionaldehyde, flammable liquid, UN1275, 6,000 gal. PGII.
   d. 6,000 gal. propionaldehyde, flam. liq., UN1275, II RQ.
   e. None of the above.

10. Dinitromethane is a proper shipping name.

   a. True
   b. False

11. Diethylaminopropylamine is the required proper shipping name for highway transportation of the material.

   a. True
   b. False

12. A 5,500-pound cargo tank load of epichlorohydrin is regulated

   a. by air and water only.
   b. as a hazardous substance by air and water only.
   c. as a hazardous material and substance by all modes of transportation.
   d. only by highway when in that quantity.

Activity 2.6

Markings

Purpose

To provide experience in the use of markings.

Directions

Using the material contained in the reading assignment and the HMT, answer the following questions.

1. The identification number to be displayed on a cargo tank load of flammable dispersant gas, n.o.s., is

   a. UN1078.
   b. 1078.
   c. UN1954.
   d. 1954.

2. A cargo tank containing 1,800 gallons of polychlorinated biphenyls (PCB's) is regulated as a hazardous substance since the RQ of 1 pound has been exceeded. Therefore, the identification number may consist of a plain white square on point.

   a. True
   b. False

3. A cargo tank load of gasoline need not display identification numbers if

   a. the flashpoint is low enough.
   b. it is considered a hazardous substance.
   c. numbers were not provided by the shipper.
   d. The placard has GASOLINE instead of FLAMMABLE on it.

4. Markings indicating the date of the last test or inspection must be shown on the cargo tank near the metal specification plate or on the front head of the tank.

   a. True
   b. False

Activity 2.7

Labeling--Part One

Purpose

To provide experience in the use of labeling.

Directions

Answer the following questions using the reading materials and the HMT.

1. Referring only to Column 6 of the HMT, indicate what label, if any, is specified for the following materials.

a.	Parathion	a. _____
b.	Consumer commodity	b. _____
c.	Petroleum gases, liquefied	c. _____
d.	Black powder (gunpowder)	d. _____
e.	Oleum (40% sulfur trioxide)	e. _____
f.	Gasoline	f. _____

2. If a label is required for items a-h below, insert the appropriate label designation in the "Label Required" column below. If no label is required, insert an "X" in the "Label Not Required" column.

		Label Required	Label Not Required
a.	A 1-gallon can of parathion being shipped from the manufacturer to the U.S. Department of Defense (DOD) through the normal transportation system in the routine manner.		
b.	A cylinder of compressed gas, n.o.s., Division 2.2, when transported by air.		
c.	A package of "Articles, explosive, Division 1.4S" loaded and unloaded by DOD and escorted by DOD personnel in a separate vehicle.		
d.	A package containing a 1-gallon can of gasoline (flashpoint of gasoline below 0°F (-17.7°C)).		
e.	Placarded freight container having a volume of 720 cu. ft. containing "Oleum."		

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		Label Required	Label Not Required
f.	A 1-liter can of gasoline meeting the limited quantity exception of 173.150 which is being transported by motor carrier.		
g.	Same can of gasoline as "f" above, except it is to be transported by aircraft.		
h.	A 4-liter can of mercury compounds liquid, n.o.s., PG III meeting the limited quantity provisions of Section 173.153.		

3. A shipper may label a package with an "Explosive 1.2" label even though that package does not contain any explosives, so the carrier will handle the package carefully and not break it.

   a. True
   b. False

4. A package labeled in accordance with IMO (formerly IMCO) requirements as specified in the International Maritime Dangerous Goods Codes does not have to be labeled as specified in Section 172.101.

   a. True
   b. False

Activity 2.7 (cont'd)

Labeling--Part Two

Answer the following questions using the reading materials and the HMT as appropriate.

1. A package of Class 3 (flammable liquid), PG I, that has a subsidiary hazard of meeting the definition of a Class 6.1 (poison liquid), PG II, requires only a "Flammable Liquid" label.

   a. True
   b. False

2. An overpack containing packages of different hazard classes would be labeled

   a. with only the label for the highest hazard class.
   b. with the label for the package containing the greatest amount of material.
   c. with labels required for each hazard class in the overpack.
   d. only when shipped by air or water.

3. A cylinder containing Division 2.2 (nonflammable gas) being transported by a common motor carrier need not be labeled if the cylinder is marked in accordance with the CGA Pamphlet C-7, Appendix A, and the cylinder is not overpacked.

   a. True
   b. False

4. A package containing chloropicrin mixtures, n.o.s., Packing Group III, must be labeled

   a. POISON only.
   b. POISON or KEEP AWAY FROM FOOD.
   c. KEEP AWAY FROM FOOD only.
   d. None of the above.

5. Which of the following modified labels can be used for a package containing oxygen, compressed?

   a. OXIDIZER.
   b. COMPRESSED GAS N.O.S.
   c. OXYGEN.
   d. OXIDIZER or OXYGEN.

6. Generally labels must be on the same surface of the package as the marked shipping name.

   a. True
   b. False

7. An unplacarded freight container of a capacity of 440 cubic feet containing four packages of "potassium cyanide," each labeled with a POISON label, and 100 packages of "consumer commodities--ORM-D" requires no labeling.

   a. True
   b. False

Activity 2.8

Placarding--Part One

Purpose

To provide experience in the use of placarding, and practice in answering scenario questions similar to the ones used in the graded activity.

Directions

Using the material contained in the reading assignment and the HMT, answer the following questions.

1. Petroleum gases, liquefied, must be placarded

   a. "Nonflammable Gas."
   b. "Flammable Gas."
   c. "Combustible."
   d. "Dangerous."

2. Hydrogen bromide, anhydrous, must be placarded

   a. "Corrosive."
   b. "Flammable Gas."
   c. "Nonflammable Gas."
   d. "Poison Gas."

3. Titanium, tetrachloride, must be placarded

   a. "Corrosive."
   b. "Corrosive and Poison."
   c. "Nonflammable Gas."
   d. "Poison Gas."

4. A cargo tank used exclusively for hauling fuel oil (flashpoint 105°F (40.5°C)) may display the following placards:

   a. "Combustible" only.
   b. "Combustible" or "Flammable."
   c. "Flammable" only.
   d. "Dangerous" only.

5. A cargo tank load of chlorine must be placarded either "Chlorine" or "Poison Gas."

   a. True
   b. False

6. "Flammable Gas" placards may **not** be used for a cargo tank load of gasoline.

   a. True
   b. False

7. A placard need not be displayed on the front of a cargo tank "pup" (full trailer), since the cargo tank truck in front of it would obscure it.

   a. True
   b. False

8. Multicompartmented cargo tank contains (a) 1,500 gallons methyl acetate and (b) 2,000 pounds phenol solutions.

   Placard(s): _____

9. Cargo tank vehicle used to transport gasoline is returning from delivery of 7,000 gallons of gasoline.

   Placard(s): _____

10. Cargo tank motor vehicle containing 7571 liters (2,000 gallons) molten sulfur is moving between Tulsa, Oklahoma, and St. Louis, Missouri.

    Placard(s): _____

The following is a practical exercise in the application of the General Placarding Requirements found in Section 172.504. Assume that the transitional periods have expired.

Listed below are shipments of hazardous materials loaded at one facility on transport vehicles and cargo tanks. The shipments are listed by shipping names shown in Section 172.101. You will have to refer to that section to determine each commodity's hazardous classification. Assume the packages involved are not excepted from labeling requirements unless otherwise indicated.

After each problem, indicate the placard(s) **required** to be displayed, if any. Sections 174.81 and 177.848 permit the loading and storage of the commodities shown in these problems. The "Dangerous" placard may be used if applicable.

11. Truck containing 1,500 pounds of ethyl fluoride packaged in cylinders.

    Placard(s): _____

12. Truck contains (a) 300 pounds of ethylamine; and (b) 500 pounds ethyl methyl ether.

    Placard(s): _____

13. Compartmented tank car contains (a) 1,500 gallons 2-ethylhexylamine; and (b) 2,000 pounds fluoroacetic acid.

    Placard(s): _____

14. Railcar contains 10 pounds of magnesium phosphide.

    Placard(s): _____

15. A railcar contains a package of methoxymethyl isocyanate weighing 65 pounds. The shipping paper indicates the material meets the poison-inhalation hazard.

    Placard(s): _____

16. A railcar contains (a) 300 pounds radioactive materials, n.o.s., bearing radioactive Yellow II label; and (b) 500 pounds of tetrahydrofuran.

    Placard(s): _____

17. Railcar contains (a) 1,000 pounds tetranitroaniline; and (b) 2,000 pounds of tetrazol-1-acetic acid.

    Placard(s): _____

18. Cargo tank motor vehicle used to transport titanium sulfate solution returning from a delivery of 5,000 gallons.

    Placard(s): _____

19. Truck containing two cylinders with the proper shipping name of ethylene oxide, 125 pounds.

    Placard(s): _____

The Segregation Table at 177.848 should be used for questions 20 and 21. If it were important to separate certain hazardous materials during transportation, wouldn't it also be important that they be separated in an emergency?

20. Truck (loaded at one facility) contains (a) 10 pounds radioactive material, n.o.s., (Yellow III label); 6,000 pounds fluorobenzene; and 20 pounds gallium.

    Placard(s): _____

21. Truck contains (a) 10,000 pounds glycerol alpha-monochlorohydrin; (b) 5,000 pounds flammable liquid, n.o.s., packaged as limited quantity; and 200 pounds isobutyl formate in a 55-gallon drum.

    Placard(s): _____

22. Truck being returned from delivering 60 drums (208 liters capacity and weighing 181 kg each) of isobutyl acetate.

    Placard(s): _____

23. Above truck being returned with 60 drums (208 liters capacity) of iodine monochloride residue.

    Placard(s): _____

Activity 2.8 (cont'd)

Placarding--Part Two: Practice Evaluation

Directions

The following scenarios are practice for the graded evaluation on the 49 CFR section of the course. These should be completed on the evening of Day 3 (Wednesday).

1. Fill in all information asked for on each scenario.

2. List problems or concerns, if any, on the lines provided in Section 3.

3. Fill out completely regardless of whether it is applicable.

4. Compare Section 2 to Section 1, and place the results in Section 3.

5. Section 3 problem asks your opinion of the package based on the information found and listed.

Incident 1

Section 1

1. You have a highway cargo tank involved in an accident. The shipping papers say "Chloracetyl chloride, 8, UN1752, PGII" 1 TL.

2. The tank is damaged on the left side and has a very small leak from the area of the only bottom outlet valve.

3. The cargo tank is a DOT 412SS, built 12/93, capacity 5,000 gallons.

Section 2

Proper Shipping Name: _____
Special Provisions: _____
Exceptions: _____
Nonbulk: _____
Bulk: _____
Placard: _____
Labels: _____
Marking: _____
Packing Group: _____
RQ: _____

Section 3

Problem

_____

_____

_____

_____

If packaged wrong, what should it be? _____

Based on the above information circle the correct answer for the following.

Is marking correct?	Y	N	N/A
Is label/placard correct?	Y	N	
Is package failure possible?	Y	N	
Is there a fire potential?	Y	N	
Is the package correct?	Y	N	
Are shipping papers correct?	Y	N	

Incident 2

Section 1

1. You have a van truck involved in an accident. The shipping papers say "Cychlohexenyltrichlorosilane, 8, UN2357, II" 60 1A2, 55-gal. drums.

2. The drums are scattered over the area; only 14 are left on the trailer.

3. Some of the drums are seeping; a few are slightly swollen. There are approximately 8 1B2 drums found among the scattered containers.

Section 2

Proper Shipping Name: _____
Special Provisions: _____
Exceptions: _____
Nonbulk: _____
Bulk: _____
Placard: _____
Labels: _____
Marking: _____
Packing Group: _____
RQ: _____

Section 3

Problem

_____

_____

_____

_____

If packaged wrong, what should it be? _____

Is marking correct?	Y	N	N/A
Is label/placard correct?	Y	N	
Is package failure possible?	Y	N	
Is there a fire potential?	Y	N	
Is the package correct?	Y	N	
Are shipping papers correct?	Y	N	

Activity 2.9

Cargo Tanks

Purpose

To provide experience using cargo tank information found in 49 CFR.

Directions

Using the material contained in the reading assignment and the HMT, answer the following questions.

1. Sodium hydroxide, solution, PG II, may be shipped in which of the following containers?

   a. DOT 407
   b. DOT 406
   c. MC 338

2. Ethylene oxide may be shipped in a DOT 407 cargo tank.

   a. True
   b. False

3. Chloroacetic acid, solution, may be transported in DOT 412 cargo tanks.

   a. True
   b. False

4. Anhydrous ammonia may be transported in a nonspecification cargo tank under certain conditions.

   a. True
   b. False

5. Germane may be shipped in any specification cargo tank.

   a. True
   b. False

6. Tetraethyl lead, liquid, may be transported in a DOT 407 cargo tank.

   a. True
   b. False

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Activity 2.10

Bulk Containers

Purpose

To provide experience using bulk container information.

Directions

Using the material contained in the reading assignment and the HMT, answer the following questions.

1. A 950-gallon capacity tank loaded and unloaded without being removed from the vehicle is a

   a. portable tank.
   b. overpack.
   c. cargo tank.
   d. None of the above.

2. Several DOT 3T cylinders are bound together on a trailer chassis. This vehicle then becomes a cargo tank because the containers are loaded and unloaded without being removed from the vehicle.

   a. True
   b. False

3. The XYZ Chemical Company buys three DOT 51 portable tanks of 1,500-gallon capacity and chains them to a flatbed trailer. Hazardous materials are transported in these containers to their customers. The tanks are emptied without being removed from the vehicle. These tanks must meet the _____ specifications in Part 178.

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Activity 2.11

Final Container Activity

Directions

1. Fill in all information asked for on each scenario.

2. List problems or concerns, if any, on the lines provided in Section 3.

3. Fill out completely regardless of whether it is applicable.

4. Compare Section 2 to Section 1, and place the results in Section 3.

5. Section 3 problem asks your opinion of the package based on the information found and listed.

Incident 1

Section 1

1. You have a highway cargo tank involved in an accident. The shipping papers say "Acrylonitrile, inhibited, 3, UN1093, PGI" 1 TL.

2. The tank is damaged on the left side and has a very small leak from the area of the only bottom outlet valve.

3. The cargo tank is a DOT 406, built 12/93, capacity 9,000 gallons. Tank is placarded 3, and marked 1093.

Section 2

Proper Shipping Name: _____
Special Provisions: _____
Exceptions: _____
Nonbulk: _____
Bulk: _____
Placard: _____
Labels: _____
Marking: _____
Packing Group: _____
RQ: _____

Preceding page blank

Section 3

Notes of problems or concerns with information.

_____

_____

_____

If packaged wrong, what should it be?_____

Based on the above information circle the correct answer for the following.

Is marking correct?	Y	N	N/A
Is label/placard correct?	Y	N	
Is package failure possible?	Y	N	
Is there a fire potential?	Y	N	
Is the package correct?	Y	N	
Are shipping papers correct?	Y	N	

Incident 2

Section 1

1. You have a highway cargo tank involved in an accident. The shipping papers say "Chlorosulfonic acid, 8, UN1754, PGI" 1 TL.

2. The tank is damaged on the left side and has a very small leak from the only bottom outlet valve.

3. The cargo tank is a DOT 407 built 12/93 capacity 5,000 gallons. Tank is placarded 8, and marked 1754.

Section 2

Proper Shipping Name: _____
Special Provisions: _____
Exceptions: _____
Nonbulk: _____
Bulk: _____
Placard: _____
Labels: _____
Marking: _____
Packing Group: _____
RQ: _____

Section 3

Notes of problems or concerns with information.

_____

_____

_____

If packaged wrong, what should it be?_____

Based on the above information circle the correct answer for the following.

Is marking correct?	Y	N	N/A
Is label/placard correct?	Y	N	
Is package failure possible?	Y	N	
Is there a fire potential?	Y	N	
Is the package correct?	Y	N	
Are shipping papers correct?	Y	N	

Incident 3

Section 1

1. You have a highway cargo tank involved in an accident. The shipping papers say "Carbon disulfide, 3, UN1131, PGI" 1 TL.

2. The tank is damaged on the left side and has a very small leak of what appears to be vapor from fitting.

3. The cargo tank is a DOT 407 built 12/93 capacity 6,000 gallons. Tank is placarded 3, and marked 1131.

Section 2

Proper Shipping Name: _____
Special Provisions: _____
Exceptions: _____
Nonbulk: _____
Bulk: _____
Placard: _____
Labels: _____
Marking: _____
Packing Group: _____
RQ: _____

Section 3

Notes of problems or concerns with information.

_____

_____

_____

If packaged wrong, what should it be?_____

Based on the above information circle the correct answer for the following.

Is marking correct?	Y	N	N/A
Is label/placard correct?	Y	N	
Is package failure possible?	Y	N	
Is there a fire potential?	Y	N	
Is the package correct?	Y	N	
Are shipping papers correct?	Y	N	

Incident 4

Section 1

1. You have a flatbed truck involved in an accident. The shipping papers say "Chloroacetone, stabilized, 6.1, UN1695, II" 401H2 drums.

2. The drums are scattered over the area; only 10 are left on the trailer.

3. Some of the drums are seeping, a few are slightly swollen. Drum is labeled 6.1, and marked 1695.

Section 2

Proper Shipping Name: _____
Special Provisions: _____
Exceptions: _____
Nonbulk: _____
Bulk: _____
Placard: _____
Labels: _____
Marking: _____
Packing Group: _____
RQ: _____

Section 3

Notes of problems or concerns with information.

_____

_____

_____

If packaged wrong, what should it be?_____

Based on the above information circle the correct answer for the following.

Is marking correct?	Y	N	N/A
Is label/placard correct?	Y	N	
Is package failure possible?	Y	N	
Is there a fire potential?	Y	N	
Is the package correct?	Y	N	
Are shipping papers correct?	Y	N	

Activity 2.12

Damage Assessment

Purpose

To provide experience in using Title 49 Code of Federal Regulations (49 CFR) and basic container information in the damage assessment process.

Directions

Each group is to read the scenario. Then, using the 49 CFR and the simulated cargo tank specification sheets, each team will complete the Container Data Sheets that include a Damage Assessment section. When that is completed, each team is to identify any 49 CFR inconsistencies and potential problems posed in this incident.

Scenario

You are at the scene of a highway accident involving two highway cargo tanks. It is 0430 on a Monday morning. The area is moderately populated. The wind is out of the south at 5 mph; the temperature is 50°F (10°C). The sky is clear with no inversion. The humidity is 66 percent; the dewpoint is 45°F (7.2°C). The forecasted weather for the day is a high of 88°F (31.1°C) with clear skies, humidity around 35 percent.

The accident is in the westbound lanes. The trucks collided while one was entering the highway. One truck swerved, overturned, and is in the ditch. The other regained control but sideswiped a bridge abutment and is upright about 1,000 feet from the first.

Both cargo tanks are loaded. One is a MC306AL; the other is an MC330 QT. Their silhouettes are visible from your location. The first engine on the scene established an isolation zone of 100 feet from each tanker.

The cargo tank in the ditch shows a single flammable placard with a 1992 marking on it. The shipping papers show "Flammable Liquid, Poisonous n.o.s. Flammable Liquid, UN1992." The product density weight is 8.2 pounds per gallon.

Your entry team has brought back the following information. See the specification plate provided.

The cargo tank is on its side at a 60-degree angle over the top. There is a large gouge on the uphill side of the tank; a small amount of product is leaking from the gouge at this time. The gouge is about 1/8 inch deep. There are four compartments. The three rear compartments' dome lids are leaking about 5 gallons a minute. The front compartment is not leaking but is very badly damaged on the uphill front corner. There is a very tight

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wrinkle and a large dent that has the entire section pushed in. The front dome lid is not leaking.

The cargo tank that is upright by the bridge abutment shows a nonflammable gas placard with a 1005 marking. The shipping papers show "Anhydrous Ammonia, Nonflammable Gas, UN1005" 1 T/L (56,000 lbs.) RQ 100 lb.

Your entry team has brought back the following information. See the specification plate provided. The truck/container is parked about 1,000 feet from the other cargo tank (MC306). The MC330 is sitting on the side of the highway facing west; it is on the other side of the overpass from the MC306.

Your entry team has informed you that the cargo tank has a severely broken rear axle, and the frame has been cracked. All air lines to the rear of the trailer have been severed. There is a 2-foot dent in the front right side of the tank. The dent slowly turns into a long scour or gouge that runs down the length of the tank. There is no product leaking at this time. The pressure inside the tank is 185 psi. The temperature of the product inside the tank is 57°F (13.9°C). The temperature of the tank is 52°F (11.1°C). The team also has informed you that a large chunk of concrete approximately 1 foot x 2 feet was knocked out of the bridge.

Fill out the Damage Assessment portion of the Container Data Sheet on the following pages.

VEHICLE MFR. FRUEHAUF CORPORATION

MFR'S SERIAL NO. PA 104654766288

D.O.T./MC SPEC. 306 AL

DATE
MFR. 5/84

ORIGINAL TEST
DATE 5/84

CERTIFICATE DATA 5/84

DESIGN PRESSURE 0 P.S.I.G.

TEST PRESSURE 3.5 P.S.I.G.

HEAD MAT'L 5454 WELD 5053
MAT'L

SHELL MAT'L 5454 LINING NONE
MAT'L

(FRONT TO REAR)
NOM. COMPT. CAP. 2400 1000 1000
1800 2400

MAX. PROD.
LOAD 86,000

U.S. GAL.
Max Pro. Den. 7.5

LBS./GAL.
MAX PRODUCT
WT. 67,000

MAX TEMP. 100

LOADING LIMITS

UNLOADING GPM 3.5 P.S.I.G.
LIMITS GPM 3.5 P.S.I.G.

Specification Plate 1

VEHICLE MFR. FRUEHAUF CORPORATION

MFR'S SERIAL NO. PA KS194429353996

D.O.T./MC SPEC. 330 HSLA QT DATE MFR. 2/70

ORIGINAL TEST DATE 2/72

CERTIFICATE DATA 2/72

DESIGN PRESSURE 265 P.S.I.G.

TEST PRESSURE 365 P.S.I.G.

HEAD MAT'L HSLA QT WELD MAT'L

SHELL MAT'L HSLA QT

(FRONT TO REAR)

NOM. COMPT. CAP. 8000 Water Gal

Specification Plate 2

CONTAINER DATE SHEET

DAMAGE ASSESSMENT

TEMPERATURE

ambient _____ forecasted _____ product _____ container _____

PRESSURES

container design _____ container test _____ adjusted test _____ internal _____

STRESSORS

Thermal: [ ] radiant [ ] impingement [ ] chemical
Chemical: [ ] corrosive [ ] acid [ ] base
[ ] oxidation [ ] substance expansion
[ ] reaction Type: _____
Mechanical: [ ] impact [ ] friction [ ] pressure
Pressure sources: _____
_____
Radiation [ ]

TYPE AND DEGREE OF DAMAGE

Damage
[ ] thermal [ ] deformative [ ] expansive
[ ] dents [ ] burns [ ] scores [ ] gouges

Additional information:
_____
_____
_____

rail and pressure: dent radius: _____ dent depth: _____

Breach location
[ ] openings [ ] shell/wall [ ] piping
[ ] valving/attachments [ ] relief devices

Additional information:
_____
_____

Type and degree

[ ] corrosion [ ] thermal burn-through
[ ] pin-hole [ ] split or tear
[ ] crack [ ] complete failure

Additional information:

_____

_____

_____

Depth on rail and pressure containers

[ ] 1/16" (little damage) [ ] 1/8" (product transfer) [ ] ¼" (critical)

CONTAINER COMPROMISE

Is the structural Integrity presently compromised? [ ] yes [ ] no

If so, by which stressor? [ ] thermal [ ] chemical [ ] mechanical

Is it possible structural Integrity may become compromised? [ ] yes [ ] no

If so, by which stressor? [ ] thermal [ ] chemical [ ] mechanical

NET THICKNESS = container thickness <u>minus</u> the depth of the damage

Specification thickness:_____ Damage thickness:_____

Is the net thickness less than the specification thickness?
[ ] yes [ ] no

Rail and pressure containers

[ ] container is critical [ ] container is not critical

If the container is critical, immediately consider tactical options.

Activity 3.1

Estimating Potential Course and Harm

Purpose

To provide the opportunity to practice estimating an incident's course and harm.

Directions

Read the scenario and information sheets provided. Then complete the form, Estimating Incident Course and Harm.

Scenario

At 2000 hours on a Sunday in October, you respond to a report of a tractor trailer stopped on an elevated section of interstate in the middle of a residential neighborhood. It is releasing a liquid. First units on the scene indicate that the liquid is flowing from the bottom rear of the trailer and entering a storm sewer. The drum failure is reportedly due to a puncture from a wooden crate. Responders report a very disagreeable odor in the area. There are 2 plastic 55-gallon drums with UN ID number 1282.

The temperature is 67°F, it is overcast and drizzling. The humidity is 89 percent with calm winds.

Remember when you are completing the form, you may not have enough information to make a specific estimate. When this is the case, answer, **unknown**.

Now complete all of the sections of the estimating checksheet that are possible with the information available in the scenario and from the completed product, container, and environmental data sheets.

Product Data Sheet --- Science Group

Incident Number ___/___/___/___ Preparer: _____
year/month/day/number
Science Officer: _____
Additional Science Personnel: _____
_____

Responders must complete a sheet for each product involved.

PRODUCT

Name: *Pyridine*
Alternate Name(s): *Azabenzene, Azine*
Chemical Formula: *$N(CH)_5$*
[ ] Structural *CHCHNCHCN*
[ ] Empirical *C_5H_5N*

IDENTIFICATION NUMBERS

UN Class/Division *3.1* UN Identification *1282* CAS *109-99-9*
STCC _____ EPA Registration _____ EPA Establishment _____

NFPA 704 DESIGNATION

[2] Health _____ [3] Flammability _____
[0] Reactivity _____ [-] Special Hazards _____

HAZARD COMMUNICATIONS/HMIS DESIGNATION

[ ] Health _____ [ ] Flammability _____
[ ] Reactivity _____ [ ] Special Hazards _____

RELEASE STATUS

[ ] No release [X] Ongoing release [ ] Complete release
[ ] Anticipated release [ ] Unknown

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QUANTITY

Reportable quantity (RQ) _____ Released quantity _____

Available for release *55-110 GAL.*

FLAMMABILITY PROPERTIES

Reference Sources	1. *C.CHEM.D.* Pg. *982*	2. *NIOSH* Pg. *190*	3. *CHRIS* Pg. *PROG.*
LEL	*2.8*	*2.8*	*2.8%*
UEL	*12.4%*	*12.4*	*12.4%*
Flashpoint	*68°F (20°C)*	*68°F*	*68°F*
Ignition temperature	*900°F (482°C)*		*900°F*
Decomposition (State yes or no)	*no*	*no*	*no*
Explosion potential			

PHYSICAL PROPERTIES

Reference Sources	1. *C.CHEM.D.* Pg. *982*	2. *NIOSH* Pg. *190*	3. *CHRIS* Pg. *PROG.*
Odor	*nauseating*	*nauseating, fish-like*	*disagreeable, unpleasant, sharp, penetrating*
Odor threshold			*.021 PPM*
Color	*yellow to colorless*	*yellow to colorless*	*yellow to colorless*
Physical state	*liquid*	*liquid*	*liquid*
Physical form [ ] Particulate [ ] Granule [ ] Slurry/gel [ ] Cryogenic [ ] Liquefied compressed gas			
Boiling and condensation point	*115.5°C*	*240°F*	*239.5°F*
Freezing and melting point	*-42°C*	*-44°F*	*-44°F*
Sublimation (State yes or no)	*no*	*no*	*no*
Specific gravity	*.95*	*.95*	*.953*
Vapor density			*2.73*
Vapor pressure		*77 MM (20°C)*	
Reid vapor pressure			*.77 PSIA*
Water solubility	*sol.*	*miscible*	*mixes*

REACTIVITY PROPERTIES

Reference Sources	1. *C.CHEM.D.* Pg. *982*	2. *NIOSH* Pg. *190*	3. *CHRIS* Pg. *PROG.*
Oxydizer (State yes or no)	*no*	*no*	*no*
Pyrophoric (State yes or no)	*no*	*no*	*no*
Corrosive (State yes or no)	*no*	*no*	*no*
pH anticipated	*no*	*no*	*no*
MSST			
SADT			
Explosion potential (State yes or no)			
Polymerization potential. (State yes or no)			
Radioactivity [ ] Alpha [ ] Beta [ ] Gamma [ ] Other			

TOXICITY

Reference Sources	1. *C.CHEM.D.* Pg. *982*	2. *NIOSH* Pg. *190*	3. *CHRIS* Pg. *PROG.*
TLV	*15 PPM*		*15 PPM*
PEL		*15 PPM*	
IDLH		*3600 PPM*	*3600 PPM*
STEL			
Ceiling			
LD_{50}			*5-5G/KG*
LC_{50}			
Exposure routes (i) Inhalation (e) Ingestion (s) Skin abs./cont.		*i,e,s*	*i,e,s*
Carcinogen (State yes or no)			
Mutagen (State yes or no)			
Teratogen (State yes or no)			
Target organs		*CNS, LIVER, KIDNEYS, GI TRACT, SKIN*	*EYES, NOSE, THROAT, SKIN*
Symptoms of exposure		*HEADACHE, DIZZINESS, NAUSEA, NERVOUSNESS, DERMATITIS*	*EYES/NOSE IRR., HEADACHE, NAUSEA, NERVOUSNESS, FREQ. URINATION*

First aid			*FLUSH TISSUE; INDUCE VOMITING*

Reference Sources	1.*CCD* Pg. *9827*	2.*NIOSH* Pg. *190*	3.*CHRIS* Pg. *PROG.*
Compatibilities			
PPE			
Substances			
Incompatibilities		*STRONG OXIDIZERS AND ACIDS*	*NONE LISTED*
PPE			
Substances			

PROTECTION DISTANCES

Isolation _____

Small quantity _____

Large quantity _____

Evacuation _____

Small quantity _____

Large quantity _____

MONITORING DATA

Anticipated atmosphere hazards

[ ] Oxidizer
[ ] Corrosive
[ ] Toxic
[ ] Oxygen deficient
[ ] Radiation
[ ] Oxygen enriched
[ ] Flammable

Relative Response Conversion Factors: _____

Substance Ionization Potential: _____ e.v.

MONITORING FACTORS

Relative response	R.R. factor	Source:
Ionization potential	I.P.:	Source:
Action levels (based on relative response)	10% LEL with R.R. factor	Source:
Minimum O_2 function level	20% LEL with R.R. factor	Source:

INSTRUMENTATION

Instrument	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time
CGI							
$\%O_2$							
pH paper							
Colorimetric tubes (name)							
Tube 1							
Tube 2							
Tube 3							
Dip stick (name)							
Radiation (specify)							
PID							
FID							

CONTAINER DATA

Responders need to complete separate forms for each container involved.

PORTABLE [X]

Nonbulk (less than 119 gal./882 lbs. capacity)

[ ] bag [ ] bottle/jar [ ] box

[ ] drum

[ ] fiber [ ] steel [ ] stainless steel

[X] plastic [ ] 35 gal. [X] 55 gal.

[ ] cylinder

[ ] liquefied compressed gas [ ] compressed gas

[ ]

Bulk

[ ] large container (tote, del, etc.)

[ ] intermodal

[ ] container/CIFC [ ] trailer/TOFC

[ ] IM 101 [ ] IM 102

[ ] SPEC 51

Capacity: gallons_____ pounds _____ cubic feet_____

FIXED CONTAINER [ ]

Atmospheric

[ ] fixed/cone roof [ ] floating roof

[ ] internal floater [ ] retrofit floater

Low pressure

[ ] dome roof

High pressure

[ ] horizontal pressure [ ] pressure sphere

[ ] reactor/process vessel

Other: _____

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TRANSPORTATION

(Check off the appropriate category and complete its section below.)

[ ] Highway [ ] Rail [ ] Air [ ] Water [ ] Pipeline

Highway

[ ] box [ ] van [ ] refrigerated
[ ] flatbed [ ] dry bulk

[ ] MC306/DOT406 [ ] MC307/DOT407
[ ] MC312/DOT412 [ ] MC331 [ ] MC338
[ ] tube trailer

Rail

[ ] flat [ ] box [ ] hopper/gondola
[ ] dry bulk [ ] tube

Tank car

non-pressure (low pressure)
[ ] DOT 103 [ ] DOT 104 [ ] DOT111
pressure
[ ] DOT 105 [ ] DOT 112 [ ] DOT 114
miscellaneous
[ ] DOT 113 [ ] DOT 115 [ ] OT 106
[ ] DOT 109 [ ] DOT 110

Other:_____

Air

[ ] passenger craft [ ] cargo craft

Water

ship: [ ] tanker [ ] container [ ] bulk cargo

Other: _____

barge: [ ] liquid [ ] liquefied gas [ ] dry bulk

Other: _____

Pipeline

[ ] liquid [ ] gas [ ] slurry

CONTAINER PRESSURE

[X] atmospheric [ ] low [ ] high [ ] ultra-high

RELIEF DEVICES

[X] none [ ] spring loaded [ ] rupture disk [ ] fusible plug/link

CONSTRUCTION MATERIALS

Nonmetallic

[ ] paper [ ] cardboard [ ] wood [ ] glass [X] plastic

Metallic

[ ] aluminum (Al) [ ] standard steel

For rail and high pressure metals

[ ] high temper low alloy (HTLA)
[ ] quench-tempered (QT)
[ ] brittle steel (pre-1966/515-B and 212-B. Use 2 in minimum radius for rail.)
[ ] ductile steel (post-1966/TC-128. Use 4 in minimum radius for rail.)
[ ] stainless steel (SS)

COMPARTMENTS

[ ] yes number _____
[X] no
Capacity and arrangement of each compartment

CODES OF CONSTRUCTION

[X]49 CFR [ ] NFPA Page: _____ Section: _____

SPECIFICATION MATERIAL THICKNESS

[ ] wall/shell/barrel [ ] head

WEIGHT

Gross: _____ Tare: _____

CONTAINER DATE SHEET

DAMAGE ASSESSMENT

TEMPERATURE

ambient _____ forecasted _____ product _____ container _____

PRESSURES

container design _____ container test _____ adjusted test _____ internal _____

STRESSORS *Unknown*

Thermal: [ ] radiant [ ] impingement [ ] chemical
Chemical: [ ] corrosive [ ] acid [ ] base
[ ] oxidation [ ] substance expansion
[ ] reaction Type: _____
Mechanical: [ ] impact [ ] friction [ ] pressure
Pressure sources: _____
_____
Radiation [ ]

TYPE AND DEGREE OF DAMAGE *Unknown*

Damage
[ ] thermal [ ] deformative [ ] expansive
[ ] dents [ ] burns [ ] scores [ ] gouges

Additional information:
_____
_____

rail and pressure: dent radius: _____ dent depth: _____

Breach location *Unknown*
[ ] openings [ ] shell/wall [ ] piping
[ ] valving/attachments [ ] relief devices

Additional information:
_____
_____

Preceding page blank

Type and degree *Unknown*

[ ] corrosion [ ] thermal burn-through
[ ] pin-hole [ ] split or tear
[ ] crack [ ] complete failure

Additional information:

_____

_____

_____

Depth on rail and pressure containers

[ ] 1/16" (little damage) [ ] 1/8" (product transfer) [ ] ¼" (critical)

CONTAINER COMPROMISE

Is the structural Integrity presently compromised? [ ] yes [ ] no

If so, by which stressor? [ ] thermal [ ] chemical [ ] mechanical

Is it possible structural Integrity may become compromised? [ ] yes [ ] no

If so, by which stressor? [ ] thermal [ ] chemical [ ] mechanical

NET THICKNESS = container thickness <u>minus</u> the depth of the damage

Specification thickness:_____ Damage thickness:_____

Is the net thickness less than the specification thickness?
[ ] yes [ ] no

Rail and pressure containers

[ ] container is critical [ ] container is not critical

If the container is critical, immediately consider tactical options.

ENVIRONMENTAL DATA SHEETS

BASIC INCIDENT INFORMATION

Location: *Interstate (elevated)*

Occupancy or transportation type: *transport/highway*

Date: _____ Initial time (in military hours): _____

Updated times: _____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Situation Status (upon arrival)

Spill (release): [ ] yes [ ] no

Contaminant: [ ] solid [X] liquid [ ] gas

Size of contaminated area: _____

Fire present: [ ] yes [ ] no

Fuel: [ ] product [ ] container [ ] exposures

Explosion: [ ] yes [ ] no

Status: [ ] ongoing [ ] occurred

Other Information: _____

CONFINEMENT

[ ] Within a structure [X] Outside

Devices: [ ] dikes [ ] retention pond [ ] detention pond

[ ] retention tanks

[ ] other _____

CONDUITS

[ ] drainage ditch/swale [ ] storm sewers [ ] gullies

EXPOSURES

Population types/numbers

[ ] involved/estimated no. _____ [ ] contaminated/estimated no. _____
[ ] injured/estimated no. _____ [ ] trapped/estimated no. _____

Populations/occupancies endangered

[ ] residential [ ] commercial [ ] mercantile
[X] industrial [ ] mixed [ ] hospital
[ ] nursing home [ ] school [ ] prison
[ ] transportation corridor

Other: _____

_____

STRUCTURE and PROPERTY TYPES

Man-made

[X] structures [ ] processes [ ] containers
[ ] vehicles [ ] water wells [ ] sewage treatment
[ ] closed water storage/treatment
[ ] food production/handling facilities
Other: _____

_____

Natural

Bodies of water

[ ] stream [ ] river [ ] pond [ ] lake
[ ] open reservoir [ ] wetlands [ ] estuary
[ ] ground water *All possible*

Surfaces

[ ] sand [ ] gravel [ ] clay [ ] compacted ground
[ ] asphalt [ ] concrete

Organisms

Animal

[ ] mammals [ ] fish [ ] birds
[ ] endangered species [ ] farm animals
[ ] dead animals/plants

Plant

[ ] agricultural [ ] aquatic

WEATHER

Responders should take meteorological readings every fifteen minutes. In critical situations, they may need readings at more frequent intervals. In non-critical situations, the intervals may be longer.

On-scene Weather Station

Time	*20 HRS*							
Temperature	*67*							
Humidity	*89*							
Dew point								
Wind direction								
Wind speed	*calm*							
Barometric pressure								

NOAA Information

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

Other Source: _____

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

ESTIMATING INCIDENT COURSE AND HARM

SPILL

Status: [ ] Present [ ] Possible [ ] Anticipated
Type: [ ] Gas/Air [ ] Liquid/Surface [ ] Liquid/Water [ ] Solid/Surface

Anticipated spread _____

_____

Anticipated impact

On responders _____

_____

On victims _____

_____

On the public _____

_____

On exposures

[ ] structures [ ] other containers [ ] other substances
[ ] production processes [ ] animals [ ] vegetation

LEAK

Status: [ ] Present [ ] Possible [ ] Anticipated
Type: _____

[ ] Anticipated

Course: [ ] remain static [ ] expand [ ] container failure
Failure: [ ] explosive [ ] violent [ ] non-violent

[ ] Not anticipated

Anticipated harm of failure

To responders: _____

_____

To the public: _____

_____

To other containers: _____

_____

To other exposures: _____

_____

Preceding page blank

FIRE

Status: [ ] Present [ ] Possible [ ] Anticipated
Possible ignition sources: _____

Anticipated course

[ ] remain static [ ] spread to exposures [ ] intensify
[ ] result in explosion(s)

Anticipated harm of controlled burn

[ ] highly contaminated smoke [ ] possible explosion(s)
[ ] threaten exposures

Anticipated harm of controlled burn

To responders: _____
_____
To the public: _____
_____
To other containers: _____
_____
To other exposures: _____
_____

Anticipated harm of suppression

[ ] highly contaminated smoke [ ] contaminated run-off
[ ] mixing of substances [ ] water reactions [ ] explosions

Contamination spread to

[ ] responders [ ] the public [ ] structures
[ ] surface water [ ] animals [ ] plants

Anticipated harm of suppression

On responders: _____
_____
On the public: _____
_____
On other containers: _____
_____
On other substances: _____
_____
On other exposures: _____
_____

Activity 5.1

Isolation

Purpose

To provide you with practice in determining the identification of appropriate isolation tactics and resources needed.

Directions

1. Your group will be assigned one of the two different scenarios for this activity.

2. You will have 40 minutes to research, discuss, and answer the questions following each scenario.

Scenario 1

At approximately 0730 hours on a Monday morning in April, biology students at State University report to their veterinary microbiology lab to start their 3-hour lab session set to start at 0800 hours. About 15 of them enter the second floor lab at the same time. As they turn the corner from the access hallway, they notice a pool of liquid on the floor in front of the walk-in incubator. Students crowd around as one opens the door to reveal a jumble of materials on the floor. Those materials that were against the door come crashing to the floor as the door is opened. They notify college security who calls 911.

Upon arrival, responders confer with the microbiology professor. She indicates that the incubator contains all types of bacterial and viral agents being grown there. She states that they include Botulinum clostridium, e. coli, equine encephalitis, anthrax, hanta virus, and many other zoonotic organisms. It is further learned that the students who discovered the problem have spread throughout the lab building. Some are in the hall outside the lab while others have gone to the lounge in the building.

It is a sunny day with very light and variable winds, humidity is 68 percent, and the temperature is 59°F.

Answer the following questions.

1. Identify the primary considerations involving isolation at the incident.

2. Identify where the incident's perimeter (outer perimeter) zones and subzones would be established.

3. Identify the initial public protection action(s) your group would take.

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Scenario 2

At approximately 1315 hours on a Thursday in October, an MC331 containing UN1589 develops a leak on the tank side of the product pump. The release is at a moderate rate of about 5 to 10 gallons per minute.

The vehicle is heading north on Fourth Avenue S.W., a busy one-way, four-lane downtown street that runs north and south and leads to the interstate. A cloud of product is spreading north up Fourth Avenue. There is also a large, two-level belowgrade parking lot under 620 Fourth Avenue and a one-level belowgrade parking lot under 645 Fourth Avenue. All of the structures in the area have basements. There is some ventilation grating from the sidewalk. The average height of the structures along Fourth Avenue is 4 stories, with 645 Fourth Ave. being 10 stories and 620 Fourth Ave. being 7 stories.

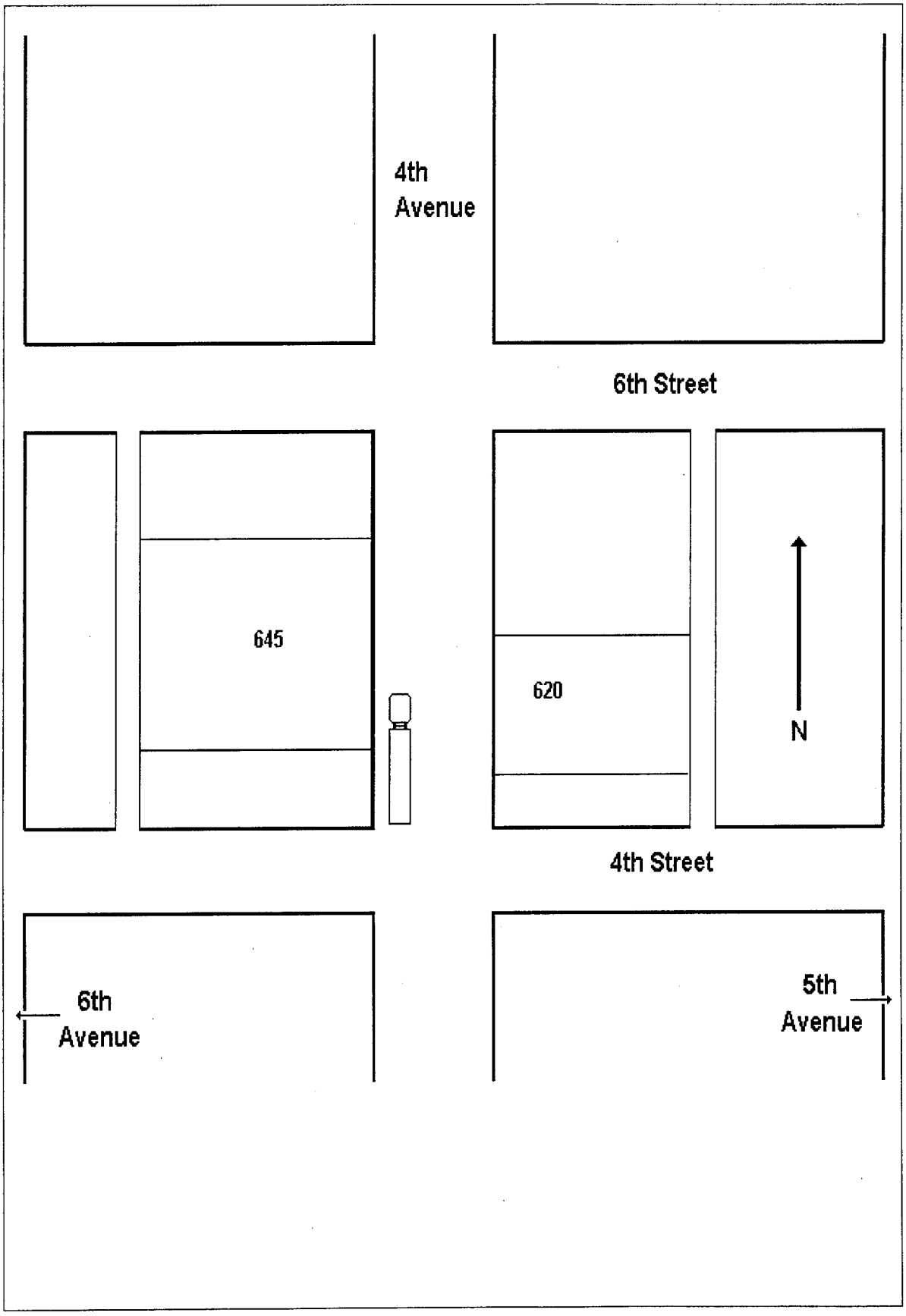
It is an overcast day with temperatures in the upper 50's. Winds are from the south at 3 to 5 mph. The humidity is 63 percent and the barometer is falling.

Answer the following questions.

1. Identify the primary considerations involving isolation at the incident.

2. Identify where the incident's perimeter (outer perimeter) zones and subzones would be established.

3. Identify the initial public protection action(s) your group would use.


4th
Avenue
6th Street
645
620
N
4th Street
6th
Avenue
5th
Avenue

Activity 5.2

Monitoring Units of Measurement

Purpose

To provide you with practice in converting units of measurement used in air monitoring.

Directions

1. You have about 20 minutes to work on the conversion problems below.

2. Read and answer the following questions.

   a. A monitoring team is operating in the hot zone with a percent LEL (CGI). The meter is calibrated for the substance zethane. Zethane has an LEL of 8 percent in air. The monitor has a reading of 15 percent of the LEL. What is the actual percentage of zethane in atmosphere that was monitored?

   b. Based on question a, how many ppm of zethane are in the atmosphere?

   c. The manufacturer's literature indicates that the relative response for zethane is 1.5. What is the corrected percentage of zethane in the hot zone?

      What is the concentration of zethane in the hot zone in ppm?

   d. An air monitor indicates a concentration of 600 ppm in the hot zone. The substance is 2-propanone. It has a TLV 2400 mg/m^3. Is the meter concentration above or below the TLV?

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Activity 5.3

Air Monitoring Devices

Purpose

To provide you with practice in identifying appropriate air monitoring devices, based on a scenario.

Directions

1. Each group will have **two** out of the six scenarios to read in order to identify the appropriate monitoring devices to be used based on the **Instrument Data Sheets** provided after the scenarios.

2. Each group will have approximately 35 to 40 minutes to work on this activity.

Scenario 1

It's a spring morning--about 0800 hours. The humidity is 88 percent; the temperature is 75°F; the wind is out of the south at 10 mph. The barometric pressure is 30.1 and rising. The dew point is 71 degrees. The temperature is expected to rise to 85°F.

There is a truck carrying 6,000 gallons of 1,2-dichloroethylene and it's leaking about 10 gallons a minute.

Monitoring will need to be done. Which device will you use?

Scenario 2

It's a spring morning--about 0800 hours. The humidity is 95 percent; the temperature is 80°F; the wind is out of the south at 10 mph. The barometric pressure is 29.5 and rising. The dew point is 78 degrees. The temperature is expected to rise to 95°F.

There is a truck carrying 2,000 gallons of hydrazine and it's leaking about 1 gallon a minute.

Monitoring will need to be done. Which device will you use?

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Scenario 3

It's a winter morning--about 0800 hours. The humidity is 25 percent; the temperature is 45°F; the wind is out of the west at 10 mph. The barometric pressure is 29.5 and rising. The dew point is 13 degrees. The temperature is expected to rise to 65°F.

There is a truck carrying 2,000 gallons of malathion in forty 55-gallon drums, and several drums are leaking. The number is unknown.

Monitoring will need to be done. Which device will you use?

Scenario 4

It's a summer evening--about 2000 hours. The humidity is 65 percent; the temperature is 75°F; the wind is out of the south at 5 mph. The barometric pressure is 29.8 and rising. The dew point is 63 degrees. The temperature is expected to fall to 62°F.

There has been a small explosion, and a cloud is forming outside a warehouse. The products that are most likely involved are hydrogen sulfide and morpholine.

Monitoring will need to be done. Which device will you use?

Hydrogen Sulfide:

Morpholine:

Scenario 5

It's a fall evening--about 2300 hours. The humidity is 88 percent; the temperature is 75°F; the wind is out of the south at 10 mph. The barometric pressure is 30.1 and steady. The dew point is 71 degrees. The temperature is expected to fall to 63°F.

A tank ruptured at a manufacturing plant and is leaking 5 gallons a minute. The tank has a capacity of 9,000 gallons. The plant people were not able to stop the leak. The product is O-xylene.

Monitoring will need to be done. Which device will you use?

Scenario 6

It's a fall evening--about 2300 hours. The humidity is 88 percent; the temperature is 75°F; the wind is out of the south at 10 mph. The barometric pressure is 30.1 and rising. The dew point is 71 degrees. The temperature is expected to fall to 63°F.

A tank ruptured at a manufacturing plant and is leaking 5 gallons a minute. The tank has a capacity of 9,000 gallons. The plant people were not able to stop the leak. The product is dichloroethyl ether.

Monitoring will need to be done. Which device will you use?

Instrument Data Sheet

INSTRUMENT: OVA

MAKE MODEL: Mouseboro 128 G

TEMPERATURE RANGE: 40°F to 105°F

HUMIDITY RANGE/CEILING: 90%

OXYGEN RANGE: 20 to 25%

uV LAMP SIZE (if applicable): 10.2

RESPONSE TIME: 2 seconds for 90%

CALIBRATED TO: Methane

TEMPERATURE AT TIME OF CALIBRATION: 60°F

CLASS: 1 **DIVISION**: 1 **GROUP**: A, B, C, D

DISQUALIFIERS: Substances that contain substituted functional groups such as (OH), (CHO), and (CI).

NOTES: The instrument is most sensitive for saturated hydrocarbon alkenes and unsaturated hydrocarbon alkenes.

To get the most accurate response using the Relative Response Chart below, multiply the meter's response by the factor on the chart that corresponds to the chemical that one is trying to detect.

Relative Response Table

Chemical	LEL	Rel. Resp.	Chemical	LEL	Rel. Resp.
Acetone	---	100	Isopropyl alcohol	---	10
Acetylene	---	200	MEK	---	80
Benzene	---	150	Methane	---	100
Butane	---	61	Methanol	---	15
Carbon tetrachloride	---	10	Methyl isobutyl ketone	---	100
Ethane	---	90	Pentane	---	100
Ethanol	---	25	Propane	---	64
Ethylene	---	85	Toluene	---	120
Hydrazine	---	140	Xylene	---	130

Instrument Data Sheet

INSTRUMENT: Colorimetric

MAKE MODEL: pH paper

TEMPERATURE RANGE: 0°F to 125°F

HUMIDITY RANGE/CEILING:

OXYGEN RANGE:

uV LAMP SIZE (if applicable):

RESPONSE TIME: 1 second

CALIBRATED TO:

TEMPERATURE AT TIME OF CALIBRATION:

CLASS: **DIVISION**: **GROUP**:

DISQUALIFIERS: Extreme heat.

NOTES: Keep in cool, dry place.

Relative Response Table

Chemical	LEL	Rel. Resp.	Chemical	LEL	Rel. Resp.

Instrument Data Sheet

INSTRUMENT: CGI **MAKE MODEL**: MM 1214S

TEMPERATURE RANGE: 32°F to 105°F **HUMIDITY RANGE/CEILING**: 88%

OXYGEN RANGE: 19.5 to 25% **uV LAMP SIZE (if applicable)**:

RESPONSE TIME: 20 seconds for 90% **CALIBRATED TO**: Hexane

TEMPERATURE AT TIME OF CALIBRATION: 70°F

CLASS: 1 **DIVISION**: 1 **GROUP**: C, D

DISQUALIFIERS: Condensating atmospheres and atmospheres containing silanes, silicones, silicates, sulfur, and lead.

NOTES: The instrument will last only 4 hours with fresh batteries.

To get the most accurate response using the Relative Response Chart below, multiply the meter's response by the factor on the chart that corresponds to the chemical that one is trying to detect.

Relative Response Table

Chemical	LEL	Rel. Resp.	Chemical	LEL	Rel. Resp.
Acetone	2.5	.68	Methane	5.0	.46
Acrylonitrile	3.0	1.68	Methylchloroform	---	---
Benzene	1.2	2.2	MEK	1.4	2.9
Butadiene	2.0	0.94	Methylene choloride	13.0	1.3
Carbon monoxide	12.5	0.76	Pentane	1.5	0.65
Chloroform	---	---	Perchloroethylene	---	---
Dimethyl formamide	2.2	1.4	Propane	2.1	0.7
Ethyl acetate	2.0	0.9	Propyl acetate	1.7	0.77
Ethyl alcohol	3.3	0.71	Propyl alcohol	2.2	0.79
Formaldehyde	7.0	2.0	Stylene	0.9	1.7
Heptane	1.05	1.1	Toluene	1.1	1.2
Hexane	1.1	1.0	Tricholorethylene	8.0	0.62
Hydrazine	2.9	2.4			
Hydrogen	4.0	0.80			

Instrument Data Sheet

INSTRUMENT: CGI **MAKE MODEL**: ASA2A

TEMPERATURE RANGE: 14°F to 114°F **HUMIDITY RANGE/CEILING**: 90%

OXYGEN RANGE: 19.5 to 25% **uV LAMP SIZE (if applicable)**:

RESPONSE TIME: 30 seconds **CALIBRATED TO**: Methane

TEMPERATURE AT TIME OF CALIBRATION: 70°F

CLASS: 1 **DIVISION**: 1 **GROUP**: D

DISQUALIFIERS: Condensating atmospheres and atmospheres containing silanes, silicones, silicates, sulfur, and lead.

NOTES: The instrument will last only 4 hours with fresh batteries.

To get the most accurate response using the Relative Response Chart below, multiply the meter's response by the factor on the chart that corresponds to the chemical that one is trying to detect.

Relative Response Table

Chemical	LEL	Rel. Resp.	Chemical	LEL	Rel. Resp.
Acetone	2.5	1.5	Methane	5.0	1.0
Acrylonitrile	3.0	---	Methylchloroform	---	---
Benzene	1.2	2.2	MEK	1.4	2.9
Butadiene	2.0	2.1	Methylene choloride	13.0	1.4
Carbon monoxide	2.5	1.7	Perchloroethylene	---	---
Chloroform	---	---	Propane	2.1	1.5
Dimethyl formamide	2.2	3.1	Propane	2.1	1.5
Ethyl acetate	2.0	2.0	Propyl acetate	11.7	1.7
Ethyl alcohol	3.3	1.6	Propyl alcohol	2.2	1.7
Formaldehyde	7.0	4.4	Stylene	0.9	3.7
Heptane	1.05	2.4	Toluene	1.1	2.6
Hexane	1.1	2.2	Tricholorethylene	8.0	1.4
Hydrazine	2.9	3.4			
Hydrogen	4.0	1.0			

Instrument Data Sheet

INSTRUMENT: PID **MAKE MODEL**: H-old 1414B

TEMPERATURE RANGE: 32°F to 100°F **HUMIDITY RANGE/CEILING**: 92%

OXYGEN RANGE: 0 to 25% **uV LAMP SIZE (if applicable)**: 10.2

RESPONSE TIME: 2 seconds for 90% **CALIBRATED TO**: Benzene

TEMPERATURE AT TIME OF CALIBRATION: 70°F

CLASS: 1 **DIVISION**: 1 **GROUP**: B, C, D

DISQUALIFIERS: This will only detect products with an eV at or below 10.2.

NOTES: Avoid conditions of hot to cold or cold to hot.

To get the most accurate response using the Relative Response Chart below, multiply the meter's response by the factor on the chart that corresponds to the chemical that one is trying to detect.

Relative Response Table

Chemical	LEL	Rel. Resp.	Chemical	LEL	Rel. Resp.
Acetone	---	0.50	Methylchloroform	---	1.56
Acrylonitrile	---	1.88	Morpholine	---	0.25
Ammonia	---	0.03	Phenol	---	0.78
Benzene	---	1.00	Phosphine	---	0.20
Hexane	---	0.22	Vinyl chloride	---	0.63
Hydrogen sulfide	---	0.50	Xylene	---	1.12

Instrument Data Sheet

INSTRUMENT: PID

MAKE MODEL: ASA Photon

TEMPERATURE RANGE: 32°F to 105°F

HUMIDITY RANGE/CEILING: 100%

OXYGEN RANGE: 0 to 25%

uV LAMP SIZE (if applicable): 10.6

RESPONSE TIME: 3 seconds for 90%

CALIBRATED TO: ISO Butylene

TEMPERATURE AT TIME OF CALIBRATION: 70°F

CLASS: 1 **DIVISION**: 1 **GROUP**: A, B, C, D

DISQUALIFIERS: This will only detect products with an eV at or below 10.6.

NOTES: Avoid conditions of hot to cold or cold to hot.

To get the most accurate response using the Relative Response Chart below, multiply the meter's response by the factor on the chart that corresponds to the chemical that one is trying to detect.

Relative Response Table

Chemical	LEL	Rel. Resp.	Chemical	LEL	Rel. Resp.
Acetone	---	1.25	Methylchloroform	---	1.75
Acrylonitrile	---	1.75	Morpholine	---	0.35
Ammonia	---	0.08	Phenol	---	0.75
Benzene	---	1.25	Phosphine	---	0.15
Hexane	---	0.25	Vinyl chloride	---	0.88
Hydrogen sulfide	---	0.55	Xylene	---	1.25

Instrument Data Sheet

INSTRUMENT: Colorimetric

MAKE MODEL: ASA Tubes

TEMPERATURE RANGE: 0°F to 125°F

HUMIDITY RANGE/CEILING:

OXYGEN RANGE:

uV LAMP SIZE (if applicable):

RESPONSE TIME: Varies by tube

CALIBRATED TO:

TEMPERATURE AT TIME OF CALIBRATION: 70°F

CLASS: **DIVISION**: **GROUP**:

DISQUALIFIERS: Extreme heat.

NOTES: Keep in a cool, dry place.

Relative Response Table

See tube instructions for the cross-sensitivity of each tube.

Instrument Data Sheet

INSTRUMENT: Electrochemical

MAKE MODEL: Pepsite 3000

TEMPERATURE RANGE: 32°F to 115°F

HUMIDITY RANGE/CEILING: 95%

OXYGEN RANGE: 0 to 25%

uV LAMP SIZE (if applicable):

RESPONSE TIME: 5 seconds

CALIBRATED TO: Selected curve

TEMPERATURE AT TIME OF CALIBRATION: 70°F

CLASS: 1

DIVISION: 1

GROUP: A, B, C, D

DISQUALIFIERS: Smoke, dust, vapor.

NOTES:

Relative Response Table

Chemical	LEL	Rel. Resp.	Chemical	LEL	Rel. Resp.

Activity 5.4

Personal Protective Equipment

Purpose

To provide you with practice in identifying appropriate PPE, based on a scenario.

Directions

1. Each group will have one of four scenarios to read in order to identify the decontamination operation appropriate for that scenario.

2. Each group has 30 minutes to work on this activity.

Scenario 1

At 1000 hours, personnel at the Civelo Chemical Company are moving a pallet of 55-gallon 1A1 containing a substance with paint-related material (UN1263). The material was identified as lacquer thinner. As a forklift moves to put a pallet containing four drums on the second tier of a rack storage system, it hits a bump and the drums fall from about 6 feet. As they strike the floor inside the loading dock, two drums split. One loses all of its contents and the other loses a major portion. Personnel notify the fire department of the problem.

Upon arrival of the first-due engine company, plant personnel provide them with a material safety data sheet (MSDS) for the product. The MSDS indicates that lacquer thinner has a PEL of 200 parts per million (ppm), is toxic by all routes of exposure, and has a flashpoint of less than 20°F (-6.7°C). When exposed to the heat of a fire, the container may explode. Some components are considered possible carcinogens. The primary constituents include toluene, xylene, methyl ethyl ketone, and ethyl acetate.

Facility personnel have evacuated the area. There are approximately 200 pallets of lacquer thinner stored on the high racks in the area of the spill.

It is an overcast Wednesday in October. The temperature is about 68°F (20°C), humidity is 58 percent, and winds are calm.

Answer the following questions.

1. Identify the primary and secondary hazards associated with this situation.

_____

_____

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2. State how these hazards affect the selection of appropriate PPE.

3. Identify the PPE you would select for entry personnel to wear, and why.

4. What PPE would you have the decontamination personnel wear, and why?

Scenario 2

At 1640 hours, a 6,000-gallon, DOT 412 cargo tank develops a leak as it proceeds north on Interstate 99. As it approaches the Fourth Street exit, the driver notices a release of product from the trailer. She pulls to the side of the road and stops.

The first-arriving unit finds product coming from the bottom of the cargo tank and vapor coming from one of the manways. This unit indicates that the cargo tank is placarded "Corrosive" with a UN1760. The captain has the shipping papers and they indicate the liquid is a hazardous waste.

Upon your arrival, you find from the hazardous waste assay with the cargo manifest that the product contains a waste mixture of hydrofluoric acid (0.5 to 20 percent), sulfuric acid (1.0 to 30 percent), phosphoric acid (1.0 to 40 percent), water (20 to 60 percent), arsenic (0.1 to 2 percent), lead (0.1 to 8 percent) and mercury (0.1 to 1.88 percent). Closer observation indicates that the leak appears to be directly through the side wall of the cargo tank, and vapor is in fact venting from two manways. The driver further states she can't figure that out because it is a stainless steel tank that her company always uses for corrosives, and that all the gaskets are Teflon and should not fail.

Answer the following questions.

1. Identify the primary and secondary hazards associated with this situation.

2. State how these hazards affect the selection of appropriate PPE.

3. Identify the PPE you would select for entry personnel to wear, and why.

4. What PPE would you have the decontamination personnel wear, and why?

Scenario 3

On a Monday evening at approximately 2300 hours, personnel at the Begnaud Specialty Metals working in the metal separation area are knocked to the floor by an explosion. A white fume cloud comes rolling through the area. They pick themselves up and see that an explosion has occurred in chemical reactor vessel 3. The top of the reactor vessel was blown off and a cloud of white smoke is rising from the opening. The workers can see the bright orange glow of a fire inside the reactor. This production area has explosion venting throughout.

Workers call 911 and indicate they have had an explosion and fire involving sodium metal. First-arriving units confirm that metallic sodium is burning in the reactor vessel. On arrival, plant personnel inform you that there are about 250 pounds of sodium burning in the reactor. They state they have salt to extinguish the fire.

The original explosion partially dislodged one of the explosion vents and buckled an overhead bay door. There is a significant amount of white smoke pouring from the building, but visibility within is still relatively good.

Answer the following questions.

1. Identify the primary and secondary hazards associated with this situation.

2. State how these hazards affect the selection of appropriate PPE.

3. Identify the PPE you would select for entry personnel to wear, and why.

4. What PPE would you have the decontamination personnel wear, and why?

Scenario 4

At the local rail yard, a DOT 111A100W1 jumps the track. As it does, its bottom outlet valve strikes a tie and is damaged. The car is placarded corrosive, UN2032. A reddish-brown vapor cloud is rapidly forming from the liquid streaming from the outlet. The rail crew notifies the Yard Master, who calls 911.

Upon arrival, haz mat personnel notice a large vapor cloud moving to the east and across the river that runs next to the track where the derailment occurred. The river runs almost due north at this location. The bank of the river is heavily overgrown with brush, and it appears that product may be flowing down the bank toward the river.

The consist indicates that the product is 98 percent red fuming nitric acid. It is 0530 on a Tuesday in June. The temperature is 72°F (22.2°C), the winds are out of the west at 3 to 5 miles an hour, and the humidity is 35 percent.

Answer the following questions.

1. Identify the primary and secondary hazards associated with this situation.

2. State how these hazards affect the selection of appropriate PPE.

3. Identify the PPE you would select for entry personnel to wear, and why.

4. What PPE would you have the decontamination personnel wear, and why?

Activity 5.5

Decontamination

Purpose

To provide you with practice in identifying appropriate decontamination setup, PPE, and solutions, based on a scenario.

Directions

1. Each group will have one of four scenarios to read in order to answer the questions that follow.

2. Each group will have 30 minutes to work on this activity.

Scenario 1

At 1430 hours, a lab technician at Shannon Chemical Labs is handling a 1-gallon jar of lithium hydride used to replenish a desiccator. She drops the jar and it strikes the lab bench, and shatters, showering the lab bench, floor, and technician with the LiH. A shard of glass strikes the technician and produces a laceration on her leg. When blood contacts the LiH, it catches fire.

Upon arrival, your personnel find the victim's tattered clothing contaminated with the LiH. Additionally, she has had several episodes where the LiH has ignited when it contacted blood or exposed skin.

Answer the following questions.

1. Identify the potential problems haz mat and EMS personnel face in managing the victim.

   _____
   _____
   _____

2. Identify the most appropriate methods available to manage the contaminated victim.

   _____
   _____
   _____

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3. What decon setup, number of corridors, wet or dry, and what solution would you recommend?

4. What PPE would you have the decontamination personnel wear, and why?

Scenario 2

At 1105 hours, an 8,000-gallon IM 102 intermodal tank being used as a horizontal storage tank at the Hi Pure Chemical Company springs a leak in the piping coming from the tank. The tank contains concentrated muriatic acid and is approximately 10 feet off the ground because it is sitting on top of another intermodal tank. This lower tank also contains muriatic acid.

As the release starts, it soaks a worker. A substantial release develops. The contaminated victim starts to leave the area and collapses. The worker is about 30 feet from the pool of product. Product also is forming a pool on the concrete floor of the facility. When the haz mat unit arrives, the first responders have isolated the area, moved the victim to the outside of the building, and started flushing the victim. They are wearing turnouts and SCBA.

Answer the following questions.

1. Identify the potential problems haz mat and EMS personnel face in managing the victim.

2. Identify the most appropriate methods to manage the contaminated victim and the first responders.

3. What decon setup, number of corridors, wet or dry, and what solution would you recommend?

4. What PPE would you have the decontamination personnel wear?

Scenario 3

On a warm (72°F; 22.2°C), clear Monday morning in June, an insulated DOT 407 is being loaded with molten phenol at the McCardle Chemical company. The phenol is stored in an insulated and heated vertical storage tank. The molten material is heated to 190°F (87.8°C) and then the material leaves the tank and is pumped into the cargo tank. As the tank is filling, a pressure leak develops in the area of the union between the fill hose and the piping on the cargo tank. The driver rushes to shut down the valve on the cargo tank. When the tank valve closes, a pressure surge causes a failure in the line. Molten phenol spews into the air and hits the driver and the facility's loading foreman. Both are hit on the head, shoulders, and chest with the molten material.

Upon arrival, your personnel find the victims with solidified phenol on their clothing and adhering to the skin on their arms, heads, and necks. Unprotected medics have started to cut off some of their clothing.

Answer the following questions.

1. Identify the potential problems haz mat and EMS personnel face in managing the victim.

2. Identify the most appropriate methods to manage the contaminated victim.

3. What decon setup, number of corridors, wet or dry, and what solution would you recommend?

4. What PPE would you have the decontamination personnel wear?

Scenario 4

At approximately 0730 hours on a Monday morning in April, biology students at State University report to their veterinary microbiology lab to start their 3-hour lab session beginning at 0800 hours. There are about 15 of them who enter the second-floor lab at the same time. As they turn the corner from the access hallway, they notice a pool of liquid on the floor in front of the walk-in incubator. Students crowd around as one opens the door to reveal a jumble of materials on the floor. Those materials that were against the door come crashing to the floor as the door is opened. They notify college security who calls 911.

Upon arrival, responders confer with the microbiology professor. She indicates that the incubator contains all types of bacterial and viral agents being grown in the incubator. She states that they include Botulinum clostridium, e. coli, equine encephalitis, anthrax, hanta virus, and many other zoonotic organisms. It is further learned that the students who discovered the problem have spread throughout the lab building. Some are in the hall outside the lab while others have gone to the lounge in the building.

It is a sunny day with very light and variable winds, humidity is 68 percent, and the temperature is 59°F (15°C).

Answer the following questions.

1. Identify the potential problems haz mat and EMS personnel face in managing the victim.

2. Identify the most appropriate methods to manage the contaminated victim.

3. What decon setup, number of corridors, wet or dry, and what solution would you recommend?

4. What PPE would you have the decontamination personnel wear?

Activity 5.6

Rescue

Purpose

To provide you with practice in identifying appropriate hazard-benefit considerations and a rescue approach, based on a scenario.

Directions

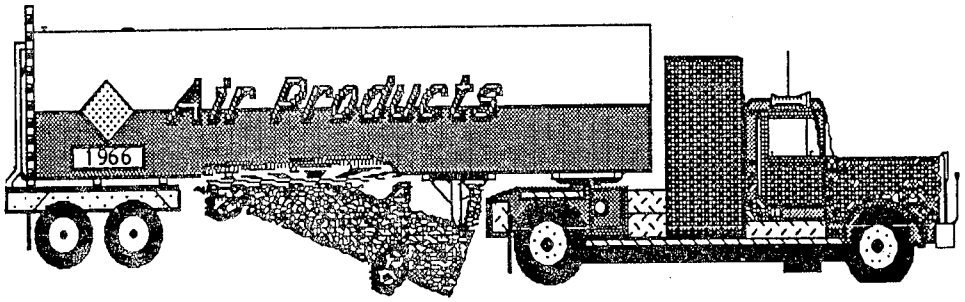
1. This activity has three parts. Part 1 is the same for all four groups. Each group has about 10 minutes to work on Part 1 before it receives Part 2.

2. Part 2 has three different scenarios. Each group has 10 minutes to work on this part of the scenario before it receives Part 3.

3. Part 3 has three different scenarios. Again each group has 10 minutes to work on this part of the scenario. At the end of the final 10 minutes, each team will report.

Part 1

You are members of a hazardous materials response special team called to assist a rescue company involved in a complicated extrication of a Plymouth Voyager from underneath a truck. A woman and a small child appear to be trapped in the vehicle. Upon your arrival, you notice the following.



Product: _____ Maximum Quantity: _____

Container type: _____

Tactical Objective(s): _____

_____

_____

_____

Methods (and reasons):

Potential Dangers:

Activity 5.7

Fire Control

Purpose

To provide practice in calculating foam firefighting needs, based on a scenario.

Directions

1. You will be divided into groups.

2. Each group will have one of the scenarios to read, perform the necessary calculations, and answer the questions that follow.

3. Each group will have approximately 40 minutes to work on this activity.

Scenario 1

You respond to a bulk tank fire in a fixed terminal facility. The tank is 120 feet in diameter and 48 feet high. On arrival you find the roof is missing from the tank and you have a fire covering the entire surface of the tank. The product is gasoline. There is no fixed system in place.

Answer the following questions:

1. What is the application rate required for this fire?

   _____

2. What appliances will you use to deliver that amount of foam?

   _____

3. How much concentrate do you need every minute of application?

   _____

   _____

4. What is the total amount of foam concentrate required on the scene before any application would begin?

   _____

   _____

5. What steps would you take to fight this fire?

Scenario 2

You respond to a bulk tank fire in a fixed terminal facility. The tank is 120 feet in diameter and 48 feet high. On arrival you find the roof is missing from the tank and you have a fire covering the entire surface of the tank. The product is fuel oil #2. There is a usable fixed system in place.

Answer the following questions:

1. What is the application rate required for this fire?

2. What appliances will you use to deliver that amount of foam?

3. How much concentrate do you need every minute of application?

4. What is the total amount of foam concentrate required on the scene before any application would begin?

5. What steps would you take to fight this fire?

Scenario 3

You respond to a bulk tank fire in a fixed terminal facility. The tank is 120 feet in diameter and 48 feet high. On arrival you find the roof is missing from the tank and you have a fire covering the entire surface of the tank. In addition, product has spilled out of the tank and is in the dike area. It is covering approximately 1,000 square feet. The product is gasoline. There is no fixed system in place.

Answer the following questions:

1. What is the application rate required for this fire?

2. What appliances will you use to deliver that amount of foam?

3. How much concentrate do you need every minute of application?

4. What is the total amount of foam concentrate required on the scene before any application would begin?

5. What steps would you take to fight this fire?

Scenario 4

You respond to a bulk tank fire in a fixed terminal facility. There are four tanks 120 feet in diameter and 48 feet high within a common dike. On arrival you find a dike fire covering almost its entire surface. The dike is 300 feet by 300 feet. The product is gasoline. There is no fixed system in place.

Answer the following questions:

1. What is the application rate required for this fire?

2. What appliances will you use to deliver that amount of foam?

3. How much concentrate do you need every minute of application?

4. What is the total amount of foam concentrate required on the scene before any application would begin?

5. What steps would you take to fight this fire?

FINAL GRADED ACTIVITIES

Unit 2--Final Activity

Purpose

To test your ability to collect, document, and provide incident data accurately.

Directions

Each Unit Objective has an evaluated activity at the end of the unit. Each of these Unit Objective Activities is an individual test. Your instructor will have you count off by six, and will assign you one of the six scenarios. **You are to work alone** with no talking. In each case, you will get blank checksheets to complete with the use of the reference libraries and possibly MSDS. You will have to share the references with a number of students so your cooperation is essential. There will be a brief explanation of the checksheets.

The Graded Activity is scheduled to take 2 hours. For this unit, you must complete product, container, and environmental checksheets. On the next pages, you will find blank data sheets that you will complete for this activity. If you have any particular questions about any of the data sheets, ask your instructor to explain them.

Once the explanation is completed, you will have the remainder of the first 90 minutes of the activity to complete the 3 forms. At that time, you must put away all references. You will receive question and answer sheets. You will have the remaining 30 minutes to answer the questions; the only source you may use to answer the questions is your completed worksheet. At that point, you must hand in the question sheets, answer sheets, and **all** of the checksheets for grading by the instructors.

The scores of the activities accumulate toward your total final course score.

It is important to remember that there may be no information in the scenario about certain aspects of the incident. **Do not** assume information not present. It is often just as important to identify what information you don't have but need.

Scenario 1

It is 1400 hours on a Monday in June. The temperature is 88°F (31.1°C) with a humidity of 65 percent. The skies are clear with a wind from the west at 5 to 8 mph. You respond to a reported strong chemical odor at a recently constructed industrial park, Miller Chemical Supply Company, located at the rear of 248 Industrial Way. First-arriving units report that a black, 55-gallon drum with a white label has fallen from a fork truck, causing a small split on the side. Product is issuing from the split and is forming a pool on the loading dock. Additional information indicates that the vapors are causing eyes to burn and water. It is thought that the UNID number is 1580. Upon arrival, you find that

the drum is just inside an open overhead door. There are many other containers in the immediate area.

Complete all of the sections of the checksheets possible with the information available in the scenario and in the reference books.

Scenario 2

The time is 0645 hours on Friday in September. The temperature is 52°F (11.1°C), humidity is 90 percent with a 0 to 3 mph wind from the south. It is partly cloudy and hazy. You respond to a reported spill at Chemical Testing Group, Fourth and Colonial Streets in a old, downtown manufacturing district. Upon arrival you find a large volume of white vapor coming from a liquid material being released by a silvery, metallic, heavily chined, 55-gallon drum. The drum has a small breach at the base of the side wall. The drum is located on the loading dock on the Fourth Street side of the structure. Allegedly, the drum contains oleum.

Complete all of the sections of the checksheets possible with the information available in the scenario and in the reference books.

Scenario 3

It is 0800 hours on a Wednesday in March. It is 40°F (4.4°C) with a 45 percent humidity and winds from the south at 10 mph. You respond to an explosion at Acme Research and Development Corp. The building containing the reactor is 200 feet from the company's main office building and shipping department. Upon arrival you find out that a 60-gallon chemical reactor vessel, being charged with THF, was over-filled and the rupture disk failed. Product sprayed all over the reactor room and then into a floor-drain and sump. An initial combustible gas indicator (CGI) reading is 20 percent of LEL at the reactor room doorway.

Complete all of the sections of the checksheets possible with the information available in the scenario and in the reference books.

Scenario 4

You arrive on scene at 2000 hours on a Sunday in October. The temperature is 67°F (19.4°C), overcast with drizzle falling. The humidity is 89 percent with calm winds. You notice a tractor on an elevated section of the interstate in the middle of a residential neighborhood releasing a liquid. First units on the scene indicate that the liquid is flowing from the bottom rear of the trailer and entering a storm sewer. They report a very disagreeable odor in the area. There are two plastic 55-gallon drums and the UNID number is 1282.

Complete all of the sections of the checksheets possible with the information available in the scenario and in the reference books.

Scenario 5

You respond to a reported vehicle accident involving chemicals. It has occurred on a main highway in a mixed commercial and residential neighborhood at 1745 hours on a Tuesday in November. It is cool with a temperature of 45°F (7.2°C) and the humidity is low at 45 percent. The wind is from the northwest at 8 mph and it is partly cloudy. Upon arrival you find that the accident involves a car and pickup truck. The pickup had three metal 55-gallon drums, one resting on its side. There is a trickle of liquid coming from the area of the bung. The liquid is flowing toward the front of the pickup bed, flowing through the bed, pooling on the street, and flowing down the gutter. The driver is pinned in the pickup truck. You find out that there is a corrosive label on the drums and that the leaking drum has the name con. methanoic acid stenciled on the top

Complete all of the sections of the checksheets possible with the information available in the scenario and in the reference books.

Scenario 6

At 1145 on a Thursday in August, you respond to assist the police at the weigh station on the interstate. Officers report that one of the step vans stopping at the weigh station was leaking a clear liquid from the bottom of the box. There is an irritating odor coming from the spill. First arriving units report that there are 10 to 15 black, 55-gallon drums inside. The police found this out when they opened the rear doors to check on the problem. The drums have red labels with a UNID number of 1198. It is a sunny day with temperatures of 83°F (28.3°C) and humidity of 56 percent.

Complete all of the sections of the checksheets possible with the information available in the scenario and in the reference books.

Product Data Sheet --- Science Group

Incident Number ___/___/___/___ Preparer: _____
year/month/day/number
Science Officer: _____
Additional Science Personnel: _____
_____

Responders must complete a sheet for each product involved.

PRODUCT

Name: _____
Alternate Name(s): _____
Chemical Formula: _____
[ ] Structural _____
[ ] Empirical _____

IDENTIFICATION NUMBERS

UN Class/Division _____ UN Identification _____ CAS _____
STCC _____ EPA Registration _____ EPA Establishment _____

NFPA 704 DESIGNATION

[ ] Health _____ [ ] Flammability _____
[ ] Reactivity _____ [ ] Special Hazards _____

HAZARD COMMUNICATIONS/HMIS DESIGNATION

[ ] Health _____ [ ] Flammability _____
[ ] Reactivity _____ [ ] Special Hazards _____

RELEASE STATUS

[ ] No release [ ] Ongoing release [ ] Complete release
[ ] Anticipated release [ ] Unknown

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QUANTITY

Reportable quantity (RQ) _____ Released quantity _____
Available for release _____

FLAMMABILITY PROPERTIES

Reference Sources	1. Pg.	2. Pg.	3. Pg.
LEL			
UEL			
Flash point			
Ignition temperature			
Decomposition (State yes or no)			
Explosion potential			

PHYSICAL PROPERTIES

Reference Sources	1. Pg.	2. Pg.	3. Pg.
Odor			
Odor threshold			
Color			
Physical state			
Physical form [ ] Particulate [ ] Granule [ ] Slurry/gel [ ] Cryogenic [ ] Liquefied compressed gas			
Boiling and condensation point			
Freezing and melting point			
Sublimation (State yes or no)			
Specific gravity			
Vapor density			
Vapor pressure			
Reid vapor pressure			
Water solubility			

REACTIVITY PROPERTIES

Reference Sources	1. Pg.	2. Pg.	3. Pg.
Oxydizer (State yes or no)			
Pyrophoric (State yes or no)			
Corrosive (State yes or no)			
pH anticipated			
MSST			
SADT			
Explosion potential (State yes or no)			
Polymerization potential. (State yes or no)			
Radioactivity [ ] Alpha [ ] Beta [ ] Gamma [ ] Other			

TOXICITY

Reference Sources	1. Pg.	2. Pg.	3. Pg.
TLV			
PEL			
IDLH			
STEL			
Ceiling			
LD_{50}			
LC_{50}			
Exposure routes (i) Inhalation (d) Ingestion (s) Skin abs./cont.			
Carcinogen (State yes or no)			
Mutagen (State yes or no)			
Teratogen (State yes or no)			
Target organs			
Symptoms of exposure			

First aid			

Reference Sources	1. Pg.	2. Pg.	3. Pg.
Compatibilities			
PPE			
Substances			
Incompatibilities			
PPE			
Substances			

PROTECTION DISTANCES

Isolation _____

Small quantity _____

Large quantity _____

Evacuation _____

Small quantity _____

Large quantity _____

MONITORING DATA

Anticipated atmosphere hazards

[ ] Oxidizer
[ ] Corrosive
[ ] Toxic
[ ] Oxygen deficient
[ ] Radiation
[ ] Oxygen enriched
[ ] Flammable

Relative Response Conversion Factors: _____
Substance Ionization Potential: _____ e.v.

MONITORING FACTORS

Relative response	R.R. factor	Source:
Ionization potential	I.P.:	Source:
Action levels (based on relative response)	10% LEL with R.R. factor	Source:
Minimum O_2 function level	20% LEL with R.R. factor	Source:

INSTRUMENTATION

Instrument	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time
CGI							
$\%O_2$							
pH paper							
Colorimetric tubes (name)							
Tube 1							
Tube 2							
Tube 3							
Dip stick (name)							
Radiation (specify)							
PID							
FID							

CONTAINER DATA

Responders need to complete separate forms for each container involved.

PORTABLE [ ]

Nonbulk (less than 119 gal./882 lbs. capacity)

[ ] bag [ ] bottle/jar [ ] box

[ ] drum

[ ] fiber [ ] steel [ ] stainless steel

[ ] plastic [ ] 35 gal. [ ] 55 gal.

[ ] cylinder

[ ] liquefied compressed gas [ ] compressed gas

[ ]

Bulk

[ ] large container (tote, del, etc.)

[ ] intermodal

[ ] container/CIFC [ ] trailer/TOFC

[ ] IM 101 [ ] IM 102

[ ] SPEC 51

Capacity: gallons_____ pounds _____ cubic feet_____

FIXED CONTAINER [ ]

Atmospheric

[ ] fixed/cone roof [ ] floating roof

[ ] internal floater [ ] retrofit floater

Low pressure

[ ] dome roof

High pressure

[ ] horizontal pressure [ ] pressure sphere

[ ] reactor/process vessel

Other: _____

_____

Preceding page blank

TRANSPORTATION

(Check off the appropriate category and complete its section below.)

[ ] Highway [ ] Rail [ ] Air [ ] Water [ ] Pipeline

Highway

[ ] box [ ] van [ ] refrigerated
[ ] flatbed [ ] dry bulk

[ ] MC306/DOT406 [ ] MC307/DOT407
[ ] MC312/DOT412 [ ] MC331 [ ] MC338
[ ] tube trailer

Rail

[ ] flat [ ] box [ ] hopper/gondola
[ ] dry bulk [ ] tube

Tank car

non-pressure (low pressure)
[ ] DOT 103 [ ] DOT 104 [ ] DOT111
pressure
[ ] DOT 105 [ ] DOT 112 [ ] DOT 114
miscellaneous
[ ] DOT 113 [ ] DOT 115 [ ] OT 106
[ ] DOT 109 [ ] DOT 110

Other:_____

Air

[ ] passenger craft [ ] cargo craft

Water

ship: [ ] tanker [ ] container [ ] bulk cargo

Other: _____

barge: [ ] liquid [ ] liquefied gas [ ] dry bulk

Other: _____

Pipeline

[ ] liquid [ ] gas [ ] slurry

CONTAINER PRESSURE

[ ] atmospheric [ ] low [ ] high [ ] ultra-high

RELIEF DEVICES

[ ] none [ ] spring loaded [ ] rupture disk [ ] fusible plug/link

CONSTRUCTION MATERIALS

Nonmetallic

[ ] paper [ ] cardboard [ ] wood [ ] glass [ ] plastic

Metallic

[ ] aluminum (Al) [ ] standard steel

For rail and high pressure metals

[ ] high temper low alloy (HTLA)
[ ] quench-tempered (QT)
[ ] brittle steel (pre-1966/515-B and 212-B. Use 2 in minimum radius for rail.)
[ ] ductile steel (post-1966/TC-128. Use 4 in minimum radius for rail.
[ ] stainless steel (SS)

COMPARTMENTS

[ ] yes number _____
[ ] no
Capacity and arrangement of each compartment

CODES OF CONSTRUCTION

[ ]49 CFR [ ] NFPA Page: _____ Section: _____

SPECIFICATION MATERIAL THICKNESS

[ ] wall/shell/barrel [ ] head

WEIGHT

Gross: _____ Tare: _____

CONTAINER DATE SHEET

DAMAGE ASSESSMENT

TEMPERATURE

ambient _____ forecasted _____ product _____ container _____

PRESSURES

container design _____ container test _____ adjusted test _____ internal _____

STRESSORS

Thermal: [ ] radiant [ ] impingement [ ] chemical
Chemical: [ ] corrosive [ ] acid [ ] base
[ ] oxidation [ ] substance expansion
[ ] reaction Type: _____
Mechanical: [ ] impact [ ] friction [ ] pressure
Pressure sources: _____
_____
Radiation [ ]

TYPE AND DEGREE OF DAMAGE

Damage
[ ] thermal [ ] deformative [ ] expansive
[ ] dents [ ] burns [ ] scores [ ] gouges

Additional information:
_____
_____
_____

rail and pressure: dent radius: _____ dent depth: _____

Breach location
[ ] openings [ ] shell/wall [ ] piping
[ ] valving/attachments [ ] relief devices

Additional information:
_____
_____

Preceding page blank

Type and degree

[ ] corrosion [ ] thermal burn-through
[ ] pin-hole [ ] split or tear
[ ] crack [ ] complete failure

Additional information:

_____

_____

_____

Depth on rail and pressure containers

[ ] 1/16" (little damage) [ ] 1/8" (product transfer) [ ] ¼" (critical)

CONTAINER COMPROMISE

Is the structural Integrity presently compromised? [ ] yes [ ] no

If so, by which stressor? [ ] thermal [ ] chemical [ ] mechanical

Is it possible structural Integrity may become compromised? [ ] yes [ ] no

If so, by which stressor? [ ] thermal [ ] chemical [ ] mechanical

NET THICKNESS = container thickness <u>minus</u> the depth of the damage

Specification thickness:_____ Damage thickness:_____

Is the net thickness less than the specification thickness?
[ ] yes [ ] no

Rail and pressure containers

[ ] container is critical [ ] container is not critical

If the container is critical, immediately consider tactical options.

ENVIRONMENTAL DATA SHEETS

BASIC INCIDENT INFORMATION

Location: _____
_____
_____

Occupancy or transportation type: _____

Date: _____ Initial time (in military hours):_____

Updated times: _____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Situation Status (upon arrival)

Spill (release): [ ] yes [ ] no
Contaminant: [ ] solid [ ] liquid [ ] gas
Size of contaminated area: _____
Fire present: [ ] yes [ ] no
Fuel: [ ] product [ ] container [ ] exposures
Explosion: [ ] yes [ ] no
Status: [ ] ongoing [ ] occurred
Other Information: _____
_____
_____

CONFINEMENT

[ ] Within a structure [ ] Outside
Devices: [ ] dikes [ ] retention pond [ ] detention pond
[ ] retention tanks
[ ] other _____
_____

CONDUITS

[ ] drainage ditch/swale [ ] storm sewers [ ] gullies

EXPOSURES

Population types/numbers

[ ] involved/estimated no. _____ [ ] contaminated/estimated no. _____
[ ] injured/estimated no. _____ [ ] trapped/estimated no. _____

Populations/occupancies endangered

[ ] residential [ ] commercial [ ] mercantile
[ ] industrial [ ] mixed [ ] hospital
[ ] nursing home [ ] school [ ] prison
[ ] transportation corridor

Other: _____

_____

STRUCTURE and PROPERTY TYPES

Man-made

[ ] structures [ ] processes [ ] containers
[ ] vehicles [ ] water wells [ ] sewage treatment
[ ] closed water storage/treatment
[ ] food production/handling facilities

Other: _____

_____

Natural

Bodies of water

[ ] stream [ ] river [ ] pond [ ] lake
[ ] open reservoir [ ] wetlands [ ] estuary
[ ] ground water

Surfaces

[ ] sand [ ] gravel [ ] clay [ ] compacted ground
[ ] asphalt [ ] concrete

Organisms

Animal

[ ] mammals [ ] fish [ ] birds
[ ] endangered species [ ] farm animals
[ ] dead animals/plants

Plant

[ ] agricultural [ ] aquatic

WEATHER

Responders should take meteorological readings every fifteen minutes. In critical situations, they may need readings at more frequent intervals. In non-critical situations, the intervals may be longer.

On-scene Weather Station

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

NOAA Information

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

Other Source: _____

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

Unit 4 Final Activity

Determining Strategic Goals

Purpose

This is the evaluated Final Activity for Units 3 and 4, designed to assess your ability to estimate course and harm and determine appropriate strategic goals.

Directions

1. This activity will take 60 minutes. You will complete the checksheet for determining strategic goals. You will receive a scenario and completed product, container, environmental data sheets, and estimating sheets.

2. You will have 30 minutes to review the scenario and the completed data sheets. Complete the estimating sheets and the strategic goal sheets. You will then have 15 minutes to answer the questions you will receive at that time.

3. Hand in the question sheets and estimating sheets for grading by the instructors.

4. Remember, this is an individual, graded activity. The only assistance you may have to answer the questions is your completed strategic goal sheet.

Scenario

You respond to a reported strong chemical odor at the rear of Miller Chemical Supply Company, 248 Industrial Way. It is in a recently constructed industrial park. First-arriving units report that a black, 55-gallon drum with a white label has fallen from a forklift, causing a small split on the side. Product is flowing from the split and is pooling on the loading dock. Additional information indicates that the vapors are causing eyes to burn and water. It is thought that the UN ID number is 1580.

Upon arrival, you find that the drum is just inside an open overhead door. There are many other containers in the immediate area.

It is 1400 hours on a Monday in June. The temperature is 88°F with a humidity of 65 percent. The skies are clear with a wind from the west at 5 to 8 mph.

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Product Data Sheet --- Science Group

Incident Number ___/___/___/___ Preparer: _____
year/month/day/number
Science Officer: _____
Additional Science Personnel: _____

Responders must complete a sheet for each product involved.

PRODUCT

Name: *Chloropicrin*
Alternate Name(s): *Perfume Nitrochloroform*
Chemical Formula: *CCl_3NO_2*
[ ] Structural *Cl_3CNO_2*
[ ] Empirical *CCl_3NO_2*

IDENTIFICATION NUMBERS

UN Class/Division *6* UN Identification *1580* CAS *176-36-2*
STCC _____ EPA Registration _____ EPA Establishment _____

NFPA 704 DESIGNATION

[4] Health _____ [0] Flammability _____
[1] Reactivity _____ [ ] Special Hazards _____

HAZARD COMMUNICATIONS/HMIS DESIGNATION

[ ] Health _____ [ ] Flammability _____
[ ] Reactivity _____ [ ] Special Hazards _____

RELEASE STATUS

[ ] No release [X] Ongoing release [ ] Complete release
[ ] Anticipated release [ ] Unknown

Preceding page blank

QUANTITY

Reportable quantity (RQ) _____ Released quantity *55 GAL.*

Available for release *Unknown*

FLAMMABILITY PROPERTIES

Reference Sources	1. *CCD* Pg. *271*	2. *NIOSH* Pg. *70*	3. *CHRIS* Pg. *CPL*
LEL			
UEL			
Flashpoint			
Ignition temperature			
Decomposition (State yes or no)			
Explosion potential			

PHYSICAL PROPERTIES

Reference Sources	1. *CCD* Pg. *271*	2. *NIOSH* Pg. *70*	3. *CHRIS* Pg. *CPL*
Odor		*Intensely Irritating*	*Extremely Irritating Lachrymator*
Odor threshold			
Color	*Colorless*	*Colorless to faint yellow*	*Colorless*
Physical state	*Oily liquid*	*Oily liquid*	*Oily liquid*
Physical form [ ] Particulate [ ] Granule [ ] Slurry/gel [ ] Cryogenic [ ] Liquefied compressed gas			
Boiling and condensation point	*112°C*	*223°F*	*223°F*
Freezing and melting point	*-69.2°C*	*-93°F*	*-93°F*
Sublimation (State yes or no)	*no*	*no*	*no*
Specific gravity		*1.4*	*1.4*
Vapor density			*5.7*
Vapor pressure		*20 mm*	
Reid vapor pressure			
Water solubility	*Slight*	*.02%*	

REACTIVITY PROPERTIES

Reference Sources	1. *CCD* Pg. *271*	2. *NIOSH* Pg. *70*	3. *CHRIS* Pg. *CPL*
Oxydizer (State yes or no)	*no*	*no*	*no*
Pyrophoric (State yes or no)	*no*	*no*	*no*
Corrosive (State yes or no)	*no*	*no*	
pH anticipated			
MSST			
SADT			
Explosion potential (State yes or no)	*no*	*yes if heated*	*yes if heated*
Polymerization potential. (State yes or no)	*no*	*no*	*no*
Radioactivity [ ] Alpha [ ] Beta [ ] Gamma [ ] Other	*no*	*no*	*no*

TOXICITY

Reference Sources	1. *CCD* Pg. *271*	2. *NIOSH* Pg. *70*	3. *CHRIS* Pg. *CPL*
TLV	*.3 ppm*		*.3 ppm*
PEL		*.3 ppm*	
IDLH		*4 ppm*	*4 ppm*
STEL			*.3 ppm*
Ceiling			
LD_{50}			*250 mg/kg*
LC_{50}			
Exposure routes (i) Inhalation (d) Ingestion (s) Skin abs./cont.	*all*	*all*	*all*
Carcinogen (State yes or no)			
Mutagen (State yes or no)			
Teratogen (State yes or no)			
Target organs		*Respiratory System, Skin, Eyes*	*Respiratory System, Eyes, GI*
Symptoms of exposure		*Irritation to Eyes; Cough, Pulmonary Edema; Vomiting, Nausea*	*Irritation on Contact; Inhalation burns, Possibly severe*

First aid		*Wash with soap; Respiratory Support*	*Flush; No vomiting; Medical Help*

Reference Sources	1. *CCD* Pg. *271*	2. *NIOSH* Pg. *70*	3. *CHRIS* Pg. *CPL*
Compatibilities			
PPE			
Substances			
Incompatibilities		*Strong Oxidizers; Heating Can Cause Detonation*	*Heated Material May Detonate*
PPE			
Substances			

PROTECTION DISTANCES

Isolation _____

Small quantity *600 ft.* _____

Large quantity *900 ft.* _____

Evacuation _____

Small quantity *2 mi.* _____

Large quantity *3 mi.* _____

MONITORING DATA

Anticipated atmosphere hazards

[ ] Oxidizer [ ] Oxygen deficient [ ] Oxygen enriched
[ ] Corrosive [ ] Radiation [ ] Flammable
[X] Toxic

Relative Response Conversion Factors: _____
Substance Ionization Potential: _____ e.v.

MONITORING FACTORS

Relative response	R.R. factor	Source:
Ionization potential	I.P.:	Source:
Action levels (based on relative response)	10% LEL with R.R. factor	Source:
Minimum O_2 function level	20% LEL with R.R. factor	Source:

INSTRUMENTATION

Instrument	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time
CGI							
$\%O_2$							
pH paper							
Colorimetric tubes (name)							
Tube 1							
Tube 2							
Tube 3							
Dip stick (name)							
Radiation (specify)							
PID							
FID							

CONTAINER DATA

Responders need to complete separate forms for each container involved.

PORTABLE [X]

Nonbulk (less than 119 gal./882 lbs. capacity)

[ ] bag [ ] bottle/jar [ ] box

[ ] drum

[ ] fiber [X] steel [ ] stainless steel

[ ] plastic [ ] 35 gal. [X] 55 gal.

[ ] cylinder

[ ] liquefied compressed gas [ ] compressed gas

[ ]

Bulk

[ ] large container (tote, del, etc.)

[ ] intermodal

[ ] container/CIFC [ ] trailer/TOFC

[ ] IM 101 [ ] IM 102

[ ] SPEC 51

Capacity: gallons_____ pounds _____ cubic feet_____

FIXED CONTAINER [ ]

Atmospheric

[ ] fixed/cone roof [ ] floating roof

[ ] internal floater [ ] retrofit floater

Low pressure

[ ] dome roof

High pressure

[ ] horizontal pressure [ ] pressure sphere

[ ] reactor/process vessel

Other: _____

_____

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TRANSPORTATION

(Check off the appropriate category and complete its section below.)

[ ] Highway [ ] Rail [ ] Air [ ] Water [ ] Pipeline

Highway

[ ] box [ ] van [ ] refrigerated
[ ] flatbed [ ] dry bulk

[ ] MC306/DOT406 [ ] MC307/DOT407
[ ] MC312/DOT412 [ ] MC331 [ ] MC338
[ ] tube trailer

Rail

[ ] flat [ ] box [ ] hopper/gondola
[ ] dry bulk [ ] tube

Tank car

non-pressure (low pressure)
[ ] DOT 103 [ ] DOT 104 [ ] DOT111
pressure
[ ] DOT 105 [ ] DOT 112 [ ] DOT 114
miscellaneous
[ ] DOT 113 [ ] DOT 115 [ ] OT 106
[ ] DOT 109 [ ] DOT 110

Other:_____

Air

[ ] passenger craft [ ] cargo craft

Water

ship: [ ] tanker [ ] container [ ] bulk cargo

Other: _____

barge: [ ] liquid [ ] liquefied gas [ ] dry bulk

Other: _____

Pipeline

[ ] liquid [ ] gas [ ] slurry

CONTAINER PRESSURE

[X] atmospheric [ ] low [ ] high [ ] ultra-high

RELIEF DEVICES

[X] none [ ] spring loaded [ ] rupture disk [ ] fusible plug/link

CONSTRUCTION MATERIALS

Nonmetallic

[ ] paper [ ] cardboard [ ] wood [ ] glass [ ] plastic

Metallic

[ ] aluminum (Al) [X] standard steel

For rail and high pressure metals

[ ] high temper low alloy (HTLA)
[ ] quench-tempered (QT)
[ ] brittle steel (pre-1966/515-B and 212-B. Use 2 in minimum radius for rail.)
[ ] ductile steel (post-1966/TC-128. Use 4 in minimum radius for rail.
[ ] stainless steel (SS)

COMPARTMENTS

[ ] yes number _____
[X] no
Capacity and arrangement of each compartment

CODES OF CONSTRUCTION

[X]49 CFR [ ] NFPA Page: _____ Section: _____

SPECIFICATION MATERIAL THICKNESS

[ ] wall/shell/barrel [ ] head

WEIGHT

Gross: _____ Tare: _____

CONTAINER DATE SHEET

DAMAGE ASSESSMENT

TEMPERATURE

ambient _____ forecasted _____ product _____ container _____

PRESSURES

container design _____ container test _____ adjusted test _____ internal _____

STRESSORS

Thermal: [ ] radiant [ ] impingement [ ] chemical
Chemical: [ ] corrosive [ ] acid [ ] base
[ ] oxidation [ ] substance expansion
[ ] reaction Type: _____
Mechanical: [X] impact [ ] friction [ ] pressure
Pressure sources: _____
_____
Radiation [ ]

TYPE AND DEGREE OF DAMAGE

Damage
[ ] thermal [ ] deformative [ ] expansive
[ ] dents [ ] burns [ ] scores [ ] gouges

Additional information:
_____
_____
_____

rail and pressure: dent radius: _____ dent depth: _____

Breach location
[ ] openings [X] shell/wall [ ] piping
[ ] valving/attachments [ ] relief devices

Additional information:
_____
_____

Preceding page blank

Type and degree

[ ] corrosion [ ] thermal burn-through
[ ] pin-hole [X] split or tear
[ ] crack [ ] complete failure

Additional information:

_____

_____

_____

Depth on rail and pressure containers

[ ] 1/16" (little damage) [ ] 1/8" (product transfer) [ ] ¼" (critical)

CONTAINER COMPROMISE

Is the structural Integrity presently compromised? [X] yes [ ] no

If so, by which stressor? [ ] thermal [ ] chemical [ ] mechanical

Is it possible structural Integrity may become compromised? [ ] yes [X] no

If so, by which stressor? [ ] thermal [ ] chemical [ ] mechanical

NET THICKNESS = container thickness <u>minus</u> the depth of the damage

Specification thickness:_____ Damage thickness:_____

Is the net thickness less than the specification thickness?
[ ] yes [ ] no

Rail and pressure containers

[ ] container is critical [ ] container is not critical

If the container is critical, immediately consider tactical options.

ENVIRONMENTAL DATA SHEETS

BASIC INCIDENT INFORMATION

Location: *248 Industrial Way*
Miller Chemical Supply Co.

Occupancy or transportation type: *Industrial*

Date: _____ Initial time (in military hours):_____

Updated times: _____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Situation Status (upon arrival)

Spill (release): [ ] yes [ ] no
Contaminant: [ ] solid [ ] liquid [ ] gas
Size of contaminated area: _____
Fire present: [ ] yes [ ] no
Fuel: [ ] product [ ] container [ ] exposures
Explosion: [ ] yes [ ] no
Status: [ ] ongoing [ ] occurred
Other Information: _____

CONFINEMENT

[X] Within a structure [ ] Outside
Devices: [ ] dikes [ ] retention pond [ ] detention pond
[ ] retention tanks
[ ] other _____

CONDUITS

[ ] drainage ditch/swale [ ] storm sewers [ ] gullies

EXPOSURES

Population types/numbers

[ ] involved/estimated no. _____ [ ] contaminated/estimated no. _____
[ ] injured/estimated no. _____ [ ] trapped/estimated no. _____

Populations/occupancies endangered

[ ] residential [ ] commercial [ ] mercantile
[X] industrial [ ] mixed [ ] hospital
[ ] nursing home [ ] school [ ] prison
[ ] transportation corridor

Other: _____
_____

STRUCTURE and PROPERTY TYPES

Man-made

[X] structures [ ] processes [ ] containers
[ ] vehicles [ ] water wells [ ] sewage treatment
[ ] closed water storage/treatment
[ ] food production/handling facilities
Other: _____
_____

Natural

Bodies of water

[ ] stream [ ] river [ ] pond [ ] lake
[ ] open reservoir [ ] wetlands [ ] estuary
[ ] ground water

Surfaces

[ ] sand [ ] gravel [ ] clay [ ] compacted ground
[ ] asphalt [ ] concrete

Organisms

Animal

[ ] mammals [ ] fish [ ] birds
[ ] endangered species [ ] farm animals
[ ] dead animals/plants

Plant

[ ] agricultural [ ] aquatic

WEATHER

Responders should take meteorological readings every fifteen minutes. In critical situations, they may need readings at more frequent intervals. In non-critical situations, the intervals may be longer.

On-scene Weather Station

Time	*14 hrs.*							
Temperature	*88°F*							
Humidity	*65%*							
Dew point								
Wind direction	*W*							
Wind speed	*5-8*							
Barometric pressure								

NOAA Information

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

Other Source: _____

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

ESTIMATING INCIDENT COURSE AND HARM

SPILL

Status: [X] Present [ ] Possible [ ] Anticipated
Type: [X] Gas/Air [ ]Liquid/Surface [ ] Liquid/Water [ ] Solid/Surface

Anticipated spread *Remain in the immediate area-all of content may be lost. Vapor may spread over a larger area.*

Anticipated impact

On responders *Highly toxic thru all routes. Highest hazard by skin contact when SCBAs are worn.*

On victims *None identified*

On the public *Limited to none if scene is secured. Workers must be evacuated.*

On exposures

[X] structures [X] other containers [X] other substances
[ ]production processes [ ] animals [ ] vegetation

LEAK

Status: [X] Present [ ] Possible [ ] Anticipated
Type: *Split*

[ ] Anticipated
Course: [X] remain static [ ] expand [ ] container failure
Failure: [ ] explosive [ ] violent [ ] non-violent
[X] Not anticipated

Anticipated harm of failure

To responders:

To the public:

To other containers:

To other exposures:

Preceding page blank

FIRE

Status: [ ] Present [ ] Possible [ ] Anticipated
Possible ignition sources: _____

Anticipated course

[ ] remain static [ ] spread to exposures [ ] intensify
[ ] result in explosion(s)

Anticipated harm of controlled burn

[ ] highly contaminated smoke [ ] possible explosion(s)
[ ] threaten exposures

Anticipated harm of controlled burn

To responders: _____
_____
To the public: _____
_____
To other containers: _____
_____
To other exposures: _____
_____

Estimating Incident Course and Harm Sheets
Page 3 of 3

Anticipated harm of suppression

[ ] highly contaminated smoke [ ] contaminated run-off
[ ] mixing of substances [ ] water reactions [ ] explosions

Contamination spread to

[ ] responders [ ] the public [ ] structures
[ ] surface water [ ] animals [ ] plants

Anticipated harm of suppression

On responders: _____
_____
On the public: _____
_____
On other containers: _____
_____
On other substances: _____
_____
On other exposures: _____
_____

PLAN OF ACTION

INCIDENT #:_____ **PREPARED BY:**_____

ISOLATION:
[ ] Establish Perimeter _____
[ ] Establish Zones _____
[ ] Deny Entry_____
[ ] Initial Public Protection _____
[ ] Withdrawal _____

NOTIFICATION:
[ ] Notify Appropriate Authorities _____
[ ] Notify Hazmat _____
[ ] Request Mutual Aid _____
[ ] Contact CHEMTREC _____
[ ] Contact NRC _____
[ ] Provide Status Report _____
[ ] Establish Staging _____

IDENTIFICATION:
[ ] Use Documentation _____
[ ] Placards and Labels _____
[ ] Reconnaissance _____
[ ] Interview _____
[ ] Review Plans _____
[ ] Monitoring _____

PROTECTION:
[ ] Decontamination _____
[ ] PPE _____
[ ] Secondary Evacuation/In-Place _____
[ ] EMS and First Aid _____
[ ] Safety Assessment _____
[ ] Pre-entry Briefing _____
[ ] Pre-entry Medical Monitoring _____

SPILL CONTROL:
RELEASE TYPE - [ ] **GAS/AIR**, [ ] **LIQUID/SURFACE**, [ ] **LIQUID/WATER**, [ ] **SOLID/SURFACE**.

GAS/AIR:
[ ] Ventilation _____
[ ] Dispersion _____
[ ] Dissolution _____
[ ] Blanketing _____

Preceding page blank

LIQUID/SURFACE:

[ ] Diking _____
[ ] Absorption _____
[ ] Adsorption _____
[ ] Retention _____

LIQUID/WATER:

[ ] Damming _____
[ ] Diversion _____
[ ] Booming _____
[ ] Absorption _____

SOLID/SURFACE:

[ ] Blanketing _____

LEAK CONTROL:

[ ] Remote Shut-offs _____
[ ] Emergency Shut-off _____
[ ] Plugging _____
[ ] Patching _____
[ ] Product Transfer _____
[ ] Overpack _____
[ ] Crimping _____
[ ] Other _____

FIRE CONTROL:

[ ] Extinguishment _____
[ ] Controlled Burn _____
[ ] Exposure Protection _____
Specify _____
[ ] Withdrawal _____

RECOVERY/TERMINATION:

[ ] Clean-up Oversight _____
[ ] Product Transfer Oversight _____
[ ] Container Righting/Removal _____
[ ] Release of Callbacks/Mutual Aid _____
[ ] Debriefing _____
[ ] Hazcom _____
[ ] Critique _____
[ ] After-Action Analysis _____
[ ] After-Action Report _____
[ ] After-Action Follow-up _____

PREPARED BY:_____ **DATE:**_____

Unit Five Final Activity

Assessing Tactical Options

Purpose

To evaluate your ability to assess tactical options and resources.

For this activity, you will be the Haz Mat Safety Officer. You will be responsible for overseeing and evaluating the work performed by Haz Mat Safety.

Scenario

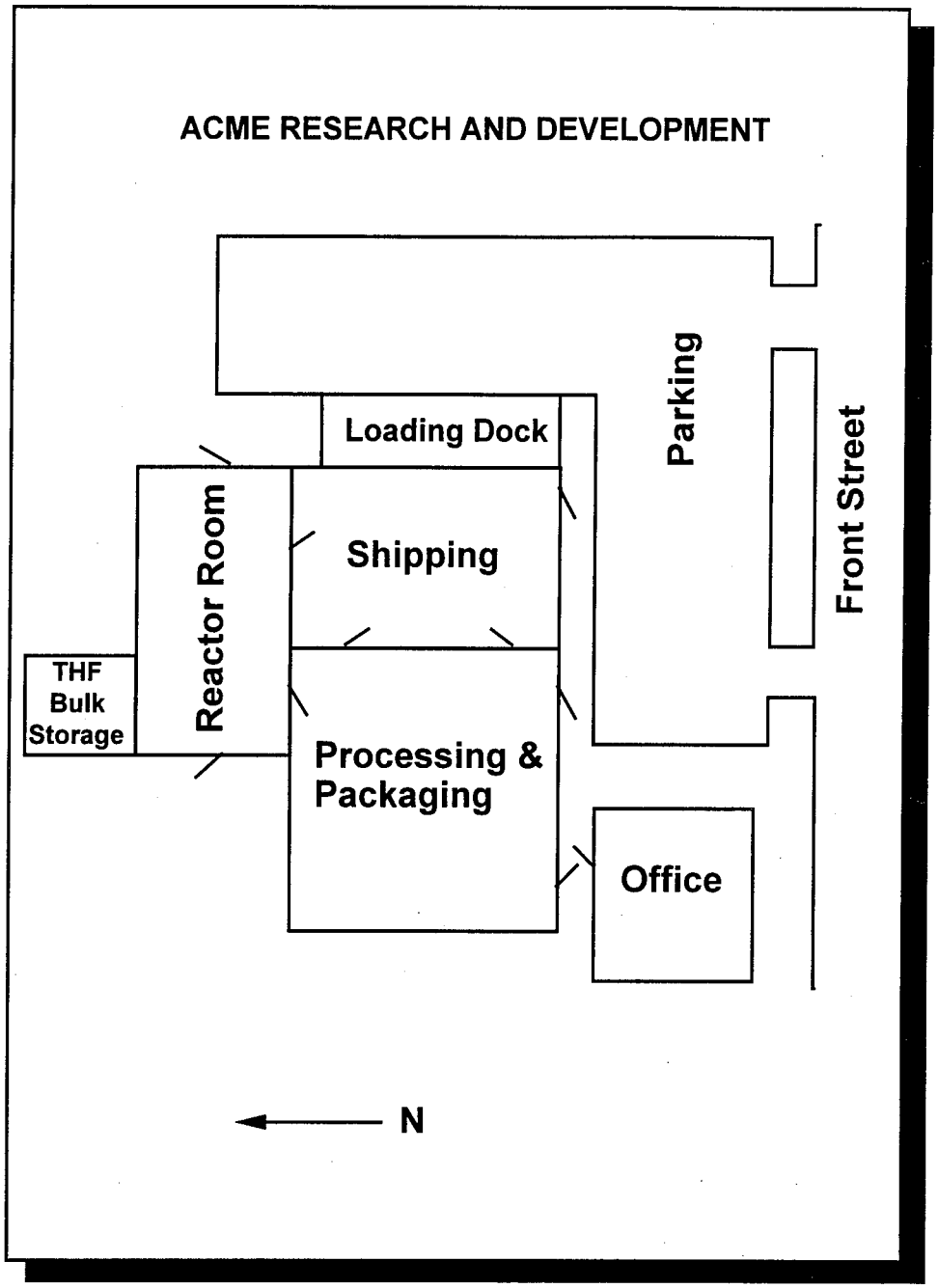
It is 0900 hours on a Wednesday in March. It is 52°F (11.1°C) with 45 percent humidity and winds from the south at 1 to 2 miles per hour (mph). The building containing the reactor room also houses the processing, packaging, and shipping departments. The office is in a separate building about 20 feet from the main building.

The haz mat unit responds to a possible explosion and spill at Acme Research and Development Corp. Upon arrival, you discover that a 200-gallon chelation chemical reactor vessel being charged with THF was overfilled. As a result, the reactor vessel's rupture disk failed and a relatively large quantity of product sprayed all over the reactor room, then ran into a trench-style floor drain. The reactor room is 50 feet by 100 feet. In two locations, there are low spots in the reactor room's concrete floor that produce 20- to 30-square-foot pools of product. The remaining product enters a trench-type floor drain that leads to a 4-inch pipe. The 4-inch pipe leads to a 200-gallon sump located at the rear of the building beside the loading dock. The sump has a metal plate cover and has an intrinsically safe, 20-gallon-per-minute (gpm) automatic transfer pump that will activate when 150 gallons of product accumulate. The pump will shut off when there are 20 gallons of product remaining in the sump. The transfer pump feeds into a 500-gallon underground holding tank. Possibly as much as 340 gallons of THF may have been lost at the time of arrival as a result of the continuing overfill and release through the failed rupture disk.

An initial sign-on combustible gas indicator (CGI) reading is 10 percent of the lower exposure level (LEL) at the west exterior reactor room doorway. (An instrumentation data sheet is provided.) Just inside the doorways at each location, the oxygen levels are between 19.9 and 20.1 percent. Due to the routine presence of flammable liquids in the area, all equipment is classified as intrinsically safe. In the loading dock area outside of the overhead doors, there is a CGI reading of 15 percent of the LEL.

1. When you receive the question sheets, read the specific tactics identified in each statement as though they were part of the pre-entry briefing. As Haz Mat Safety Officer, you are responsible for determining if each tactic (objective, method, and resources) is safe and whether you can allow staff to perform the tactic.

2. Indicate the acceptability or non-acceptability of each tactic. If not acceptable, state why.


ACME RESEARCH AND DEVELOPMENT
Loading Dock
Parking
Front Street
Reactor Room
Shipping
THF
Bulk
Storage
Processing &
Packaging
Office
N

INSTRUMENT DATA SHEET

INSTRUMENT: CGI **MAKE/MODEL:** Sign-On

TEMPERATURE RANGE: 25°F to 115°F **HUMIDITY CEILING:** 89%

OXYGEN RANGE: 19.5 to 25% **uV LAMP SIZE:** N/A

RESPONSE TIME: 15 seconds **CALIBRATED TO:** Hexane

TEMPERATURE AT TIME OF CALIBRATION: 70°F

CLASS: 1 **DIVISION:** 1 **GROUP:** B, C, D

DISQUALIFIERS: Condensing atmospheres and those containing silanes, silicones, leads, other particulates.

NOTES: The instrument will last for only 3 hours with fresh batteries.

Relative Response Table

Chemical	LEL	Rel. Resp.	Chemical	LEL	Rel. Resp.
Acetone	2.5	1.5	Methane	5	.5
Acrylonitrile	3.0	---	Methylchloroform	---	---
Benzene	1.2	2.2	MEK	1.4	2.9
Carbon monoxide	2.5	1.7	Perchloroethylene	---	---
Ethyl acetate	2.0	2.0	Propane	2.1	1.5
Formaldehyde	7.0	4.4	Propyl acetate	11.7	1.7
Heptane	1.05	2.4	Propyl alcohol	2.2	1.7
Hydrazine	2.9	3.4	Styrene	0.9	3.7
Hydrogen	4.0	1.0	Tetrahydrofuran	2.0	1.2
Kerosene	3.2	2.6	Toluene	8.0	1.4

INSTRUMENT DATA SHEET

INSTRUMENT: FID **MAKE/MODEL:** Batbox

TEMPERATURE RANGE: 35°F to 115°F **HUMIDITY CEILING:** 92%

OXYGEN RANGE: 19.5 to 25% **UV LAMP SIZE:** N/A

RESPONSE TIME: 10 seconds **CALIBRATED TO:** Methane

TEMPERATURE AT TIME OF CALIBRATION: 70°F

CLASS: 1 **DIVISION:** 1 **GROUP:** A, B, C, D

DISQUALIFIERS: Condensing atmospheres and those containing silanes, silicones, leads, other particulates.

NOTES: The instrument will last for only 3 hours with fresh batteries.

RELATIVE RESPONSE TABLE

Chemical	LEL	Rel. Resp.	Chemical	LEL	Rel. Resp.
Acetone	2.5	1.5	Methane	5	.5
Acrylonitrile	3.0	---	Methylchloroform	---	---
Benzene	1.2	2.2	MEK	1.4	2.9
Carbon monoxide	2.5	1.7	Perchloroethylene	---	---
Ethyl acetate	2.0	2.0	Propane	2.1	1.5
Formaldehyde	7.0	4.4	Propyl acetate	11.7	1.7
Heptane	1.05	2.4	Propyl alcohol	2.2	1.7
Hydrazine	2.9	3.4	Styrene	0.9	3.7
Hydrogen	4.0	1.0	Tetrahydrofuran	2.0	1.2
Kerosene	3.2	2.6	Toluene	8.0	1.4

INSTRUMENT DATA SHEET

INSTRUMENT: FID **MAKE/MODEL:** Soxbox

TEMPERATURE RANGE: 25°F to 120°F **HUMIDITY CEILING:** 80%

OXYGEN RANGE: 19.5 to 25% **uV LAMP SIZE:** N/A

RESPONSE TIME: 15 seconds **CALIBRATED TO:** Hexane

TEMPERATURE AT TIME OF CALIBRATION: 70°F

CLASS: 2 **DIVISION:** 2 **GROUP:** B, C, D

DISQUALIFIERS: Condensing atmospheres and those containing silanes, silicones, leads, or flammable vapors.

NOTES: The instrument will last for only 3 hours with fresh batteries.

Product Data Sheet --- Science Group

Incident Number ___/___/___/___ Preparer: _____
year/month/day/number
Science Officer: _____
Additional Science Personnel: _____
_____

Responders must complete a sheet for each product involved.

PRODUCT

Name: *Tetrahydrofuran*
Alternate Name(s): *THF*
Chemical Formula: _____
[ ] Structural $CH_2CH_2OCH_2CH_2$
[ ] Empirical C_4H_8O

IDENTIFICATION NUMBERS

UN Class/Division *3.2* UN Identification *2056* CAS *100-01-1*
STCC _____ EPA Registration _____ EPA Establishment _____

NFPA 704 DESIGNATION

[2] Health _____ [3] Flammability _____
[0] Reactivity _____ [ ] Special Hazards _____

HAZARD COMMUNICATIONS/HMIS DESIGNATION

[ ] Health _____ [ ] Flammability _____
[ ] Reactivity _____ [ ] Special Hazards _____

RELEASE STATUS

[ ] No release [X] Ongoing release [ ] Complete release
[ ] Anticipated release [ ] Unknown

QUANTITY

Reportable quantity (RQ) _____ Released quantity *340 GAL.*

Available for release *Unknown*

FLAMMABILITY PROPERTIES

Reference Sources	1. *CCD* Pg. *1135*	2. *NIOSH* Pg. *210*	3. *NFPA* Pg.
LEL			
UEL			
Flash point			
Ignition temperature			
Decomposition (State yes or no)			
Explosion potential			

PHYSICAL PROPERTIES

Reference Sources	1. *CCD* Pg. *1135*	2. *NIOSH* Pg. *210*	3. *NFPA* Pg.
Odor		*Etherial*	
Odor threshold			
Color	*waterwhite*	*Colorless*	
Physical state	*liquid*	*liquid*	*liquid*
Physical form [ ] Particulate [ ] Granule [ ] Slurry/gel [ ] Cryogenic [ ] Liquefied compressed gas	*N/A*	*N/A*	*N/A*
Boiling and condensation point	*70°C*	*165°F*	*165°F*
Freezing and melting point	*-65°C*	*-163°F*	---
Sublimation (State yes or no)	*no*	*no*	*no*
Specific gravity	*.889*	*.89*	*.9*
Vapor density			
Vapor pressure		*68°F/32mm*	
Reid vapor pressure			
Water solubility	*soluble*	*miscible*	*yes*

REACTIVITY PROPERTIES

Reference Sources	1. *CCD* Pg. *1135*	2. *NIOSH* Pg. *210*	3. *NFPA* Pg.
Oxydizer (State yes or no)	*no*	*no*	
Pyrophoric (State yes or no)	*no*	*no*	
Corrosive (State yes or no)	*no*	*no*	
pH anticipated			
MSST			
SADT			
Explosion potential (State yes or no)	*no*	*may form peroxides*	*may form peroxides*
Polymerization potential. (State yes or no)	*no*	*no*	
Radioactivity [ ] Alpha [ ] Beta [ ] Gamma [ ] Other	*no*	*no*	

TOXICITY

Reference Sources	1. *CCD* Pg. *1135*	2. *NIOSH* Pg. *210*	3. *NFPA* Pg.
TLV	*230 ppm*	*230 ppm*	
PEL			
IDLH		*20,000 ppm*	
STEL		*250 ppm*	
Ceiling			
LD_{50}			
LC_{50}			
Exposure routes (i) Inhalation (d) Ingestion (s) Skin abs./cont.	*i,d*	*i,s*	
Carcinogen (State yes or no)			
Mutagen (State yes or no)			
Teratogen (State yes or no)			
Target organs		*Eyes, Skin, Resp. Tract, CNS*	
Symptoms of exposure		*Eyes and Respiratory Irritation, Nausea, Headaches*	

First aid		*Flush with water; Resp. support*	

Reference Sources	1. *CCD* Pg. *1135*	2. *NIOSH* Pg. *210*	3. *NFPA* Pg.
Compatibilities			
PPE			
Substances			
Incompatibilities		*Strong Oxidizers; lithium or aluminum alloys*	*Air on storage; Li/Al Hydride; Hydroxides*
PPE	*Solvent for vinyl*		
Substances			

PROTECTION DISTANCES

Isolation _____

Small quantity _____

Large quantity _____

Evacuation _____

Small quantity _____

Large quantity _____

MONITORING DATA

Anticipated atmosphere hazards

[X] Oxidizer
[ ] Corrosive
[ ] Toxic
[ ] Oxygen deficient
[ ] Radiation
[ ] Oxygen enriched
[X] Flammable

Relative Response Conversion Factors: _____
Substance Ionization Potential: *9.45* e.V.

MONITORING FACTORS

Relative response	R.R. factor	Source:
Ionization potential	I.P.:	Source:
Action levels (based on relative response)	10% LEL with R.R. factor	Source:
Minimum O_2 function level	20% LEL with R.R. factor	Source:

INSTRUMENTATION

Instrument	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time
CGI	*10-15% LEL*						
$\%O_2$	*19.9-20.1%*						
pH paper							
Colorimetric tubes (name)							
Tube 1							
Tube 2							
Tube 3							
Dip stick (name)							
Radiation (specify)							
PID							
FID							

CONTAINER DATA

Responders need to complete separate forms for each container involved.

PORTABLE [ ]

Nonbulk (less than 119 gal./882 lbs. capacity)

[ ] bag [ ] bottle/jar [ ] box

[ ] drum

[ ] fiber [ ] steel [ ] stainless steel

[ ] plastic [ ] 35 gal. [ ] 55 gal.

[ ] cylinder

[ ] liquefied compressed gas [ ] compressed gas

[ ]

Bulk

[ ] large container (tote, del, etc.)

[ ] intermodal

[ ] container/CIFC [ ] trailer/TOFC

[ ] IM 101 [ ] IM 102

[ ] SPEC 51

Capacity: gallons_____ pounds _____ cubic feet_____

FIXED CONTAINER [X]

Atmospheric

[ ] fixed/cone roof [ ] floating roof

[ ] internal floater [ ] retrofit floater

Low pressure

[ ] dome roof

High pressure

[ ] horizontal pressure [ ] pressure sphere

[X] reactor/process vessel

Other: *possible low pressure*

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TRANSPORTATION

(Check off the appropriate category and complete its section below.)

[ ] Highway [ ] Rail [ ] Air [ ] Water [ ] Pipeline

Highway

[ ] box [ ] van [ ] refrigerated
[ ] flatbed [ ] dry bulk

[ ] MC306/DOT406 [ ] MC307/DOT407
[ ] MC312/DOT412 [ ] MC331 [ ] MC338
[ ] tube trailer

Rail

[ ] flat [ ] box [ ] hopper/gondola
[ ] dry bulk [ ] tube

Tank car

non-pressure (low pressure)
[ ] DOT 103 [ ] DOT 104 [ ] DOT111
pressure
[ ] DOT 105 [ ] DOT 112 [ ] DOT 114
miscellaneous
[ ] DOT 113 [ ] DOT 115 [ ] OT 106
[ ] DOT 109 [ ] DOT 110

Other:_____

Air

[ ] passenger craft [ ] cargo craft

Water

ship: [ ] tanker [ ] container [ ] bulk cargo

Other: _____

barge: [ ] liquid [ ] liquefied gas [ ] dry bulk

Other: _____

Pipeline

[ ] liquid [ ] gas [ ] slurry

CONTAINER PRESSURE

[ ] atmospheric [X] low [ ] high [ ] ultra-high

RELIEF DEVICES

[ ] none [ ] spring loaded [X] rupture disk [ ] fusible plug/link

CONSTRUCTION MATERIALS

Nonmetallic

[ ] paper [ ] cardboard [ ] wood [ ] glass [ ] plastic

Metallic

[X] aluminum (Al) [ ] standard steel

For rail and high pressure metals

[ ] high temper low alloy (HTLA)
[ ] quench-tempered (QT)
[ ] brittle steel (pre-1966/515-B and 212-B. Use 2 in minimum radius for rail.)
[ ] ductile steel (post-1966/TC-128. Use 4 in minimum radius for rail.
[ ] stainless steel (SS)

COMPARTMENTS

[ ] yes number _____
[X] no
Capacity and arrangement of each compartment

CODES OF CONSTRUCTION

[ ]49 CFR [ ] NFPA Page: _____ Section: _____

SPECIFICATION MATERIAL THICKNESS

[ ] wall/shell/barrel [ ] head

WEIGHT

Gross: _____ Tare: _____

CONTAINER DATA SHEET

DAMAGE ASSESSMENT

TEMPERATURE

ambient _X_ forecasted _____ product _____ container _____

PRESSURES *UNKNOWN*

container design _____ container test _____ adjusted test _____ internal _____

STRESSORS

Thermal: [ ] radiant [ ] impingement [ ] chemical
Chemical: [ ] corrosive [ ] acid [ ] base
[ ] oxidation [ ] substance expansion
[ ] reaction Type: _____
Mechanical: [ ] impact [ ] friction [X] pressure
Pressure sources: *overfill*
_____
Radiation [ ]

TYPE AND DEGREE OF DAMAGE

Damage
[ ] thermal [ ] deformative [ ] expansive
[ ] dents [ ] burns [ ] scores [ ] gouges

Additional information:
Failed rupture disk
_____
_____

rail and pressure: dent radius: _____ dent depth: _____

Breach location
[ ] openings [ ] shell/wall [ ] piping
[ ] valving/attachments [X] relief devices

Additional information:
Failed rupture disk
_____

Preceding page blank

Type and degree

[ ] corrosion [ ] thermal burn-through
[ ] pin-hole [ ] split or tear
[ ] crack [ ] complete failure

Additional information:

_____

_____

_____

Depth on rail and pressure containers

[ ] 1/16" (little damage) [ ] 1/8" (product transfer) [ ] ¼" (critical)

CONTAINER COMPROMISE

Is the structural Integrity presently compromised? [ ] yes [X] no

If so, by which stressor? [ ] thermal [ ] chemical [X] mechanical

Is it possible structural Integrity may become compromised? [ ] yes [X] no

If so, by which stressor? [ ] thermal [ ] chemical [ ] mechanical

NET THICKNESS = container thickness <u>minus</u> the depth of the damage

Specification thickness:_____ Damage thickness:_____

Is the net thickness less than the specification thickness?
[ ] yes [ ] no

Rail and pressure containers

[ ] container is critical [ ] container is not critical

If the container is critical, immediately consider tactical options.

ENVIRONMENTAL DATA SHEETS

BASIC INCIDENT INFORMATION

Location: *Acme Research and Development Corp.*

Occupancy or transportation type: *Industrial*

Date: _____ Initial time (in military hours): _____

Updated times: _____ _____ _____ _____ _____

_____ _____ _____ _____ _____

Situation Status (upon arrival)

Spill (release): [X] yes [ ] no

Contaminant: [ ] solid [X] liquid [ ] gas

Size of contaminated area: _____

Fire present: [ ] yes [ ] no

Fuel: [ ] product [ ] container [ ] exposures

Explosion: [X] yes [ ] no

Status: [ ] ongoing [X] occurred

Other Information: *Overfill is possible cause.*

CONFINEMENT

[X] Within a structure [ ] Outside

Devices: [ ] dikes [ ] retention pond [ ] detention pond

[ ] retention tanks

[ ] other _____

CONDUITS

[ ] drainage ditch/swale [ ] storm sewers [ ] gullies

EXPOSURES

Population types/numbers

[ ] involved/estimated no. _____ [ ] contaminated/estimated no. _____
[ ] injured/estimated no. _____ [ ] trapped/estimated no. _____

Populations/occupancies endangered

[ ] residential [ ] commercial [ ] mercantile
[X] industrial [ ] mixed [ ] hospital
[ ] nursing home [ ] school [ ] prison
[ ] transportation corridor

Other: _____

_____

STRUCTURE and PROPERTY TYPES

Man-made

[X] structures [X] processes [ ] containers
[ ] vehicles [ ] water wells [ ] sewage treatment
[ ] closed water storage/treatment
[ ] food production/handling facilities

Other: _____

_____

Natural *Not available*

Bodies of water

[ ] stream [ ] river [ ] pond [ ] lake
[ ] open reservoir [ ] wetlands [ ] estuary
[ ] ground water

Surfaces

[ ] sand [ ] gravel [ ] clay [ ] compacted ground
[ ] asphalt [ ] concrete

Organisms

Animal

[ ] mammals [ ] fish [ ] birds
[ ] endangered species [ ] farm animals
[ ] dead animals/plants

Plant

[ ] agricultural [ ] aquatic

WEATHER

Responders should take meteorological readings every fifteen minutes. In critical situations, they may need readings at more frequent intervals. In non-critical situations, the intervals may be longer.

On-scene Weather Station

Time	*0800*							
Temperature	*52°F*							
Humidity	*45%*							
Dew point								
Wind direction	*S*							
Wind speed	*1-2 MPH*							
Barometric pressure								

NOAA Information

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

Other Source: _____

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

ESTIMATING INCIDENT COURSE AND HARM

SPILL

Status: [X] Present [ ] Possible [ ] Anticipated
Type: [X] Gas/Air [X] Liquid/Surface [ ] Liquid/Water [ ] Solid/Surface

Anticipated spread *Vapor and liquid spread are enhanced by conduits (floor drain and sump). Travel distance not known at this time. Appears to have entered surrounding areas.*

Anticipated impact

On responders *Primary concern: flammable atmospheres and ignition potential*

On victims *None noted*

On the public *Possible employees in office*

On exposures

[X] structures [ ] other containers [ ] other substances
[ ]production processes [ ] animals [ ] vegetation

LEAK

Status: [X] Present [ ] Possible [ ] Anticipated
Type: *Rupture disk failure*

[X] Anticipated
Course: [X] remain static [ ] expand [ ] container failure
Failure: [ ] explosive [ ] violent [ ] non-violent
[ ] Not anticipated *Failure has occurred*

Anticipated harm of failure *N/A*

To responders:

To the public:

To other containers:

To other exposures:

Preceding page blank

FIRE

Status: [X] Present [ ] Possible [X] Anticipated
Possible ignition sources: _____

Anticipated course

[ ] remain static [ ] spread to exposures [ ] intensify
[ ] result in explosion(s)

Anticipated harm of controlled burn

[ ] highly contaminated smoke [ ] possible explosion(s)
[ ] threaten exposures

Anticipated harm of controlled burn

To responders: _____

To the public: _____

To other containers: *Unknown*

To other exposures: *Potential for damage to original structure*

Estimating Incident Course and Harm Sheets
Page 3 of 3

Anticipated harm of suppression

[ ] highly contaminated smoke [X] contaminated run-off
[ ] mixing of substances [ ] water reactions [ ] explosions

Contamination spread to

[ ] responders [ ] the public [ ] structures
[X] surface water [X] animals [X] plants

Anticipated harm of suppression

On responders: _____
_____
On the public: _____
_____
On other containers: _____
_____
On other substances: _____
_____
On other exposures: *Run-off* _____
Toxicity is not a problem. _____

SPILL CONTROL DATA SHEETS

PRODUCT CONSIDERATIONS

Physical state: [ ] solid [ ] liquid [ ] gas

Form:
[ ] compressed, liquefied gas
[ ] molten solid
[ ] powders, dusts
[ ] gel
[ ] cryogenic liquid
[ ] filings, shavings
[ ] slurry

Other _____

RELEASE CONSIDERATIONS

Status: [ ] none [ ] potential [ ] ongoing [ ] completed

Type: [ ] gas/air [ ] liquid/water [ ] liquid/surface [ ] solid/surface

TACTICAL OPTION CHOSEN

gas/air [ ] natural ventilation [ ] hydraulic ventilation [ ] mechanical ventilation**
**(If mechanical: [ ] house system [ ] positive pressure [ ] negative pressure)
[ ] diversion (change of direction)
[ ] dissipation (injection of air from fog streams or fan)
[ ] dissolution (use of water fog for water soluble gas or vapor)
[ ] blanketing (covering a liquid or solid to suppress vapors)

liquid/surface

[ ] diking Method _____
_____
[ ] diverting Method _____
_____
[ ] absorbing Method _____
_____
[ ] adsorbing Method _____
_____
[ ] neutralizing Method _____
_____

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[ ] gelling Method _____

[ ] solidifying Method _____

[ ] diluting Method _____

[ ] retaining Method _____

[ ] blanketing Method _____

[ ] emulsifying Method _____

liquid/water

[ ] damming Method _____

[ ] absorbing Method _____

[ ] booming Method _____

[ ] retaining Method _____

[ ] diverting Method _____

solid/surface

blanketing Method _____

LEAK CONTROL DATA SHEETS

LEAK TYPE

State and form of product _____

Container pressure _____

Container structural stability _____

Container physical stability _____

DIRECT CONTROL OPTION(S) CHOSEN

[ ] Plug method _____

[ ] Patch method _____

[ ] Crimp method _____

[ ] Overpack method _____

[ ] Shutoff method _____

INDIRECT CONTROL OPTION(S) CHOSEN

[ ] Product transfer method _____

[ ] Shutoff method _____

[ ] Pressure reduction method _____

[ ] Product displacement method _____

OTHER OPTIONS

[ ] Flare method _____

_____

[ ] Vent and burn method _____

_____

FIRE CONTROL DATA SHEET

Fire

[ ] present [ ] possible [ ] not possible

Product Involved

[ ] explosive [ ] flammable liquid [ ] flammable solid
[ ] flammable gas [ ] radioactive [ ] pesticide
[ ] other _____
_____

Appropriate Extinguishing Agent

[ ] water [ ] foam [ ] dry chemical (ABC) [ ] dry powder
[ ] hazardous materials foam

Foam Type

[ ] protein [ ] fluoroprotein [ ] AFFF [ ] FFFP
[ ] polar solvent [ ] hazardous materials

PERSONAL PROTECTIVE EQUIPMENT

Type of PPE

[ ] structural firefighting [ ] thermal [ ] chemical

Chemical Protective Clothing Level

[ ] Level A [ ] Level B [ ] Level C [ ] Level D

CGI

Colorimetric

[ ] tubes [ ] pH paper [ ] product specific systems

[ ] oxygen

[ ] PID

[ ] FID

[ ] radiation

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TEAM PROJECT

Team Project--Part I

Purpose

The Team Project is part of the evaluation and grading process for the course. Specifically, the Team Project requires teams of students to work in a group, applying the GEDAPER process.

Conducting the Activity

This 2-week project involves these steps.

1. On Day 5 or 6 the class will form four teams. Each team will receive a scenario on which it will be working for the remainder of the class.

2. Each team will receive a scenario at the end of Day 5 or 6 of the class. At that time, each team will also receive the three specific products, container type, and environmental data involved for the scenario.

3. At the end of the second Wednesday, the team will receive the last part of the scenario.

4. Each team will make a presentation of its scenario and of each step in the process to the whole class.

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Team Project--Part I

Scenario 1

Three primary substances are involved in this incident:

1. Concentrated hydrochloric acid.
2. Formaldehyde, 50 percent.
3. Phenol.

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Team Project--Part II

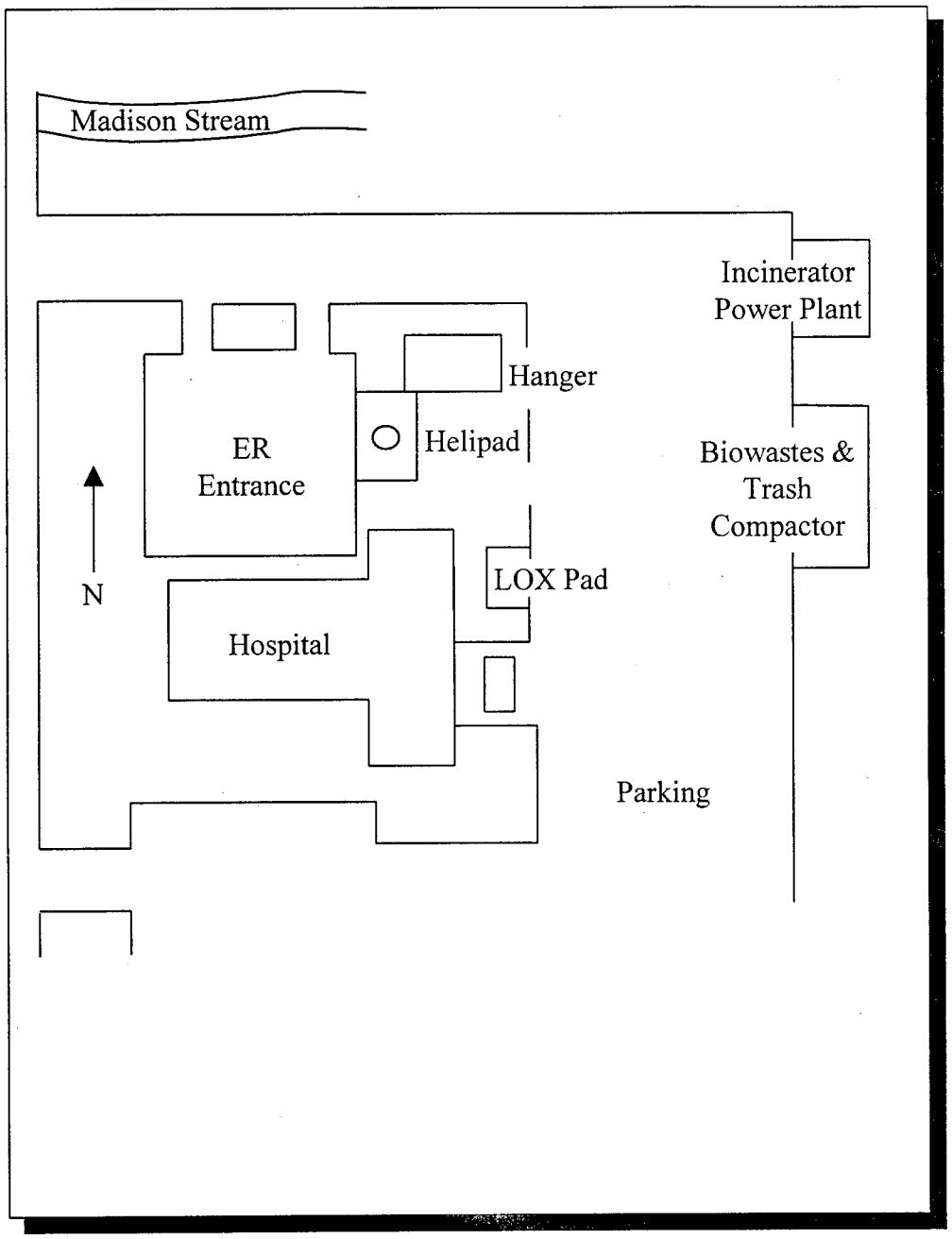
Scenario 1: Container Data

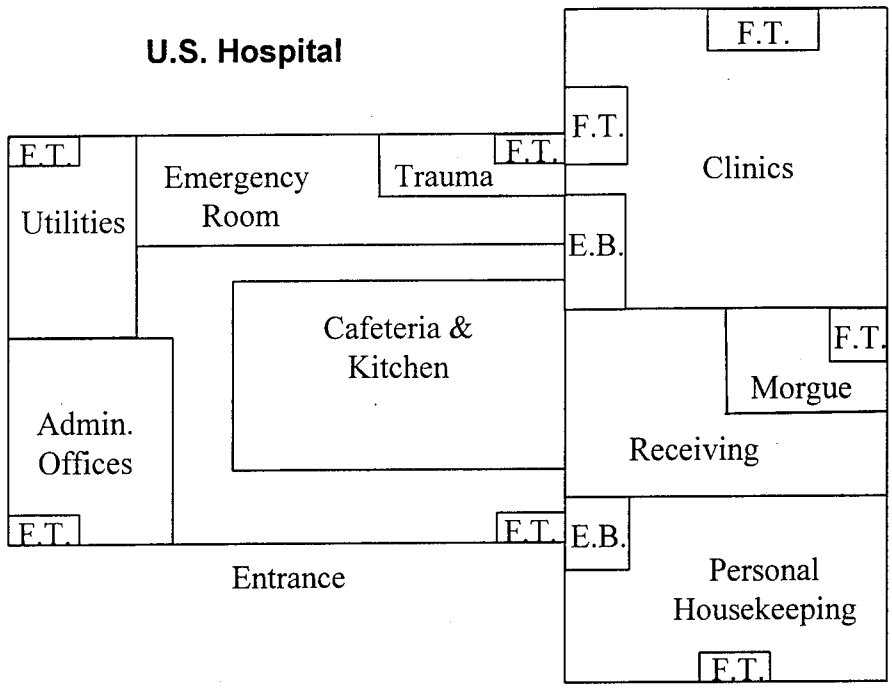
All containers at the hospital are nonbulk, with the exception of the liquid oxygen (LOX) containers. There are a few substances (primary corrosives) in 55-gallon drums. Additionally, there are various compressed gases in cylinders at various locations, especially in the lab and the operating rooms. All other substances are found in containers ranging in size from several ounces to a maximum of 5 gallons. The construction materials include paper, glass, plastic, cardboard, metal, ceramic, and combinations of these materials.

Environmental Data

The structure is an 8-story, 600-bed medical facility constructed in 1971. It met a basic building code of the time. The facility is a designated, state-of-the-art trauma and burn center. Operating room #5 has laser surgery capability. There is an MRI/CAT scan facility.

It is a Thursday in late April. The temperature is expected to range between 52°F and 68°F. It is expected to be partly cloudy early in the day, with progressing overcast. There is a 60-percent possibility of showers by the evening. The relative humidity will range from 70 to 90 percent. Winds will be variable from the south to southeast.


Madison Stream
Incinerator
Power Plant
Hanger
ER
Entrance
Helipad
Biowastes &
Trash
Compactor
N
LOX Pad
Hospital
Parking



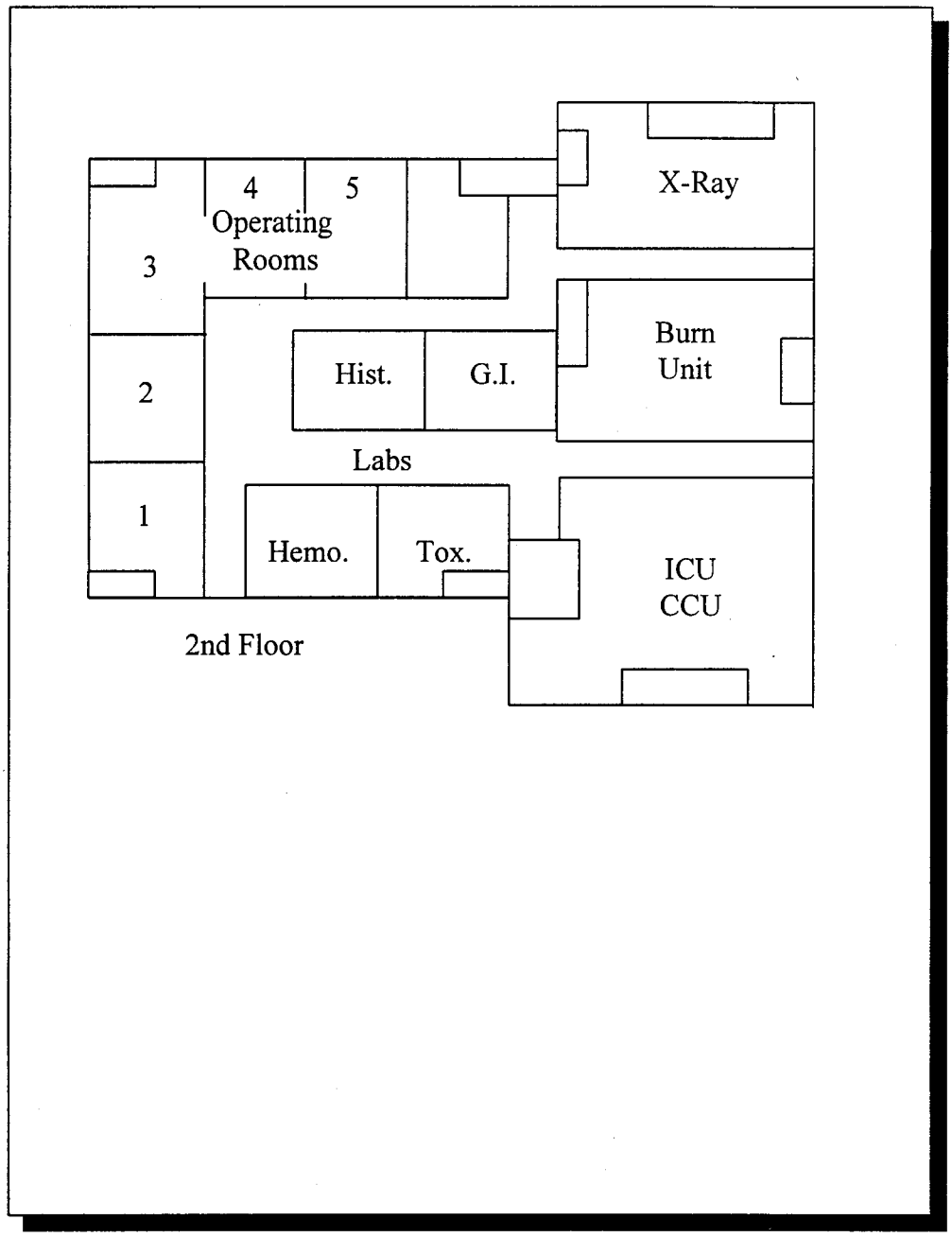
1st Floor

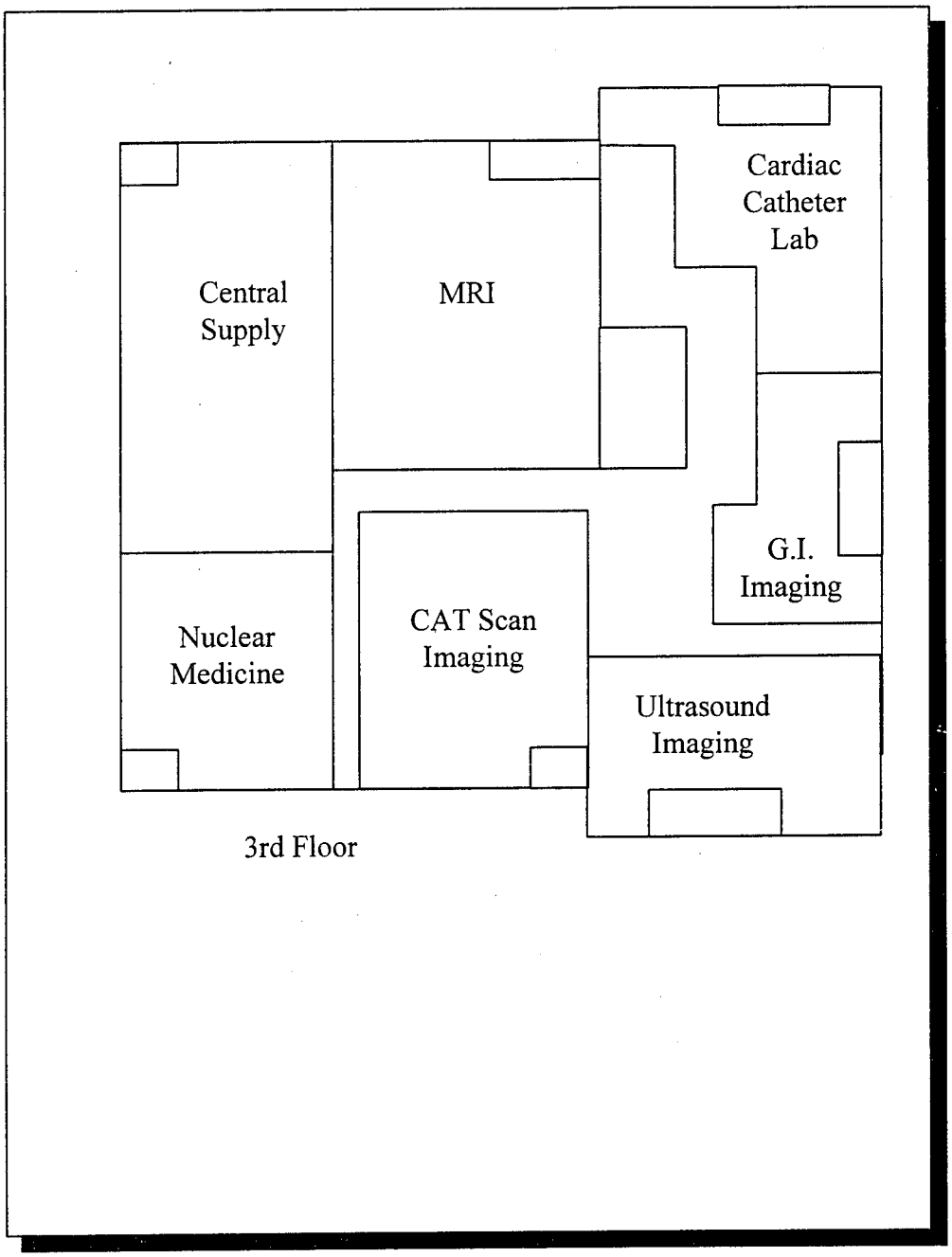
F.T. - Fire Stair Tower
E.B. - Elevator Bank

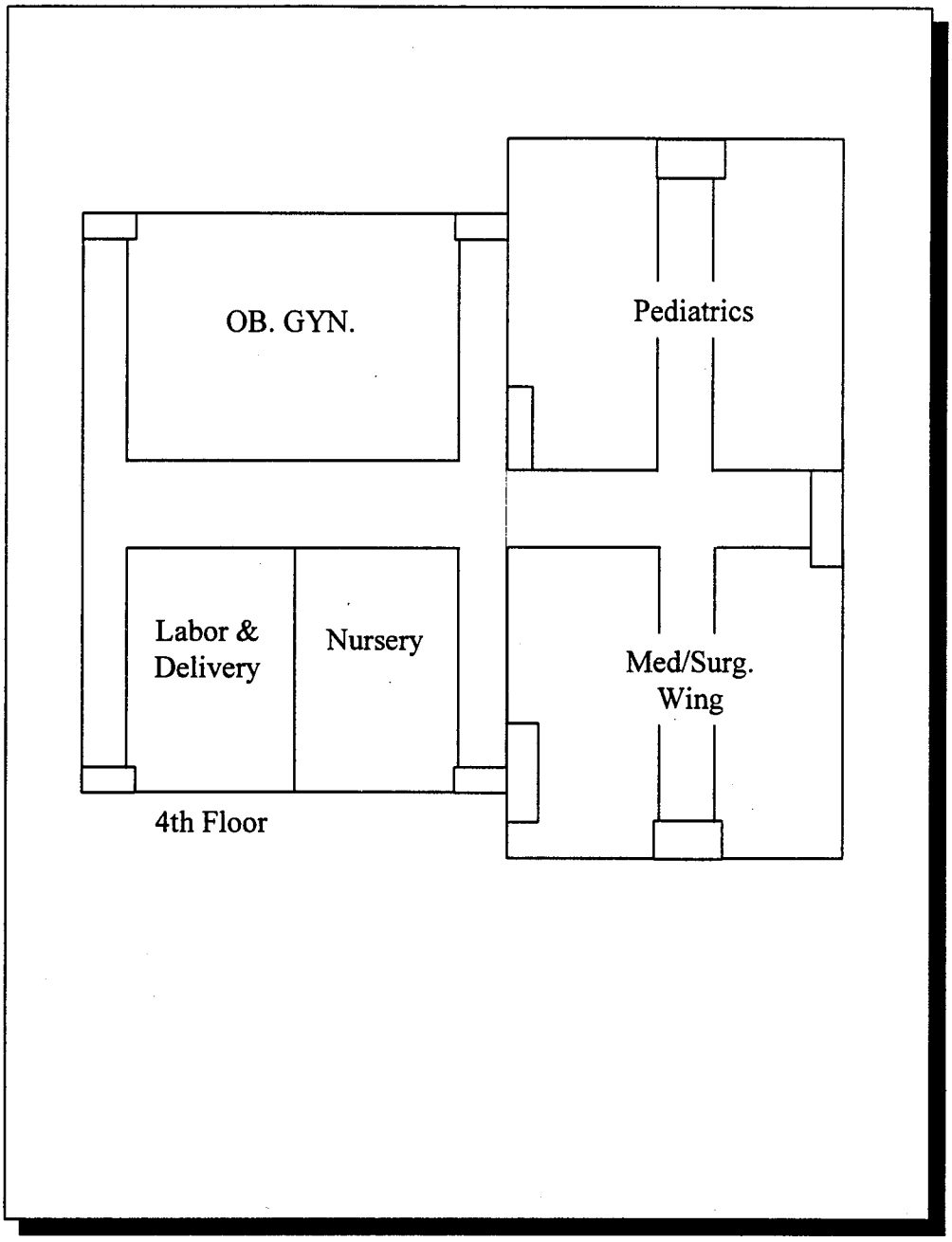
The fire towers and elevator banks are located at the same place on each floor above the first.

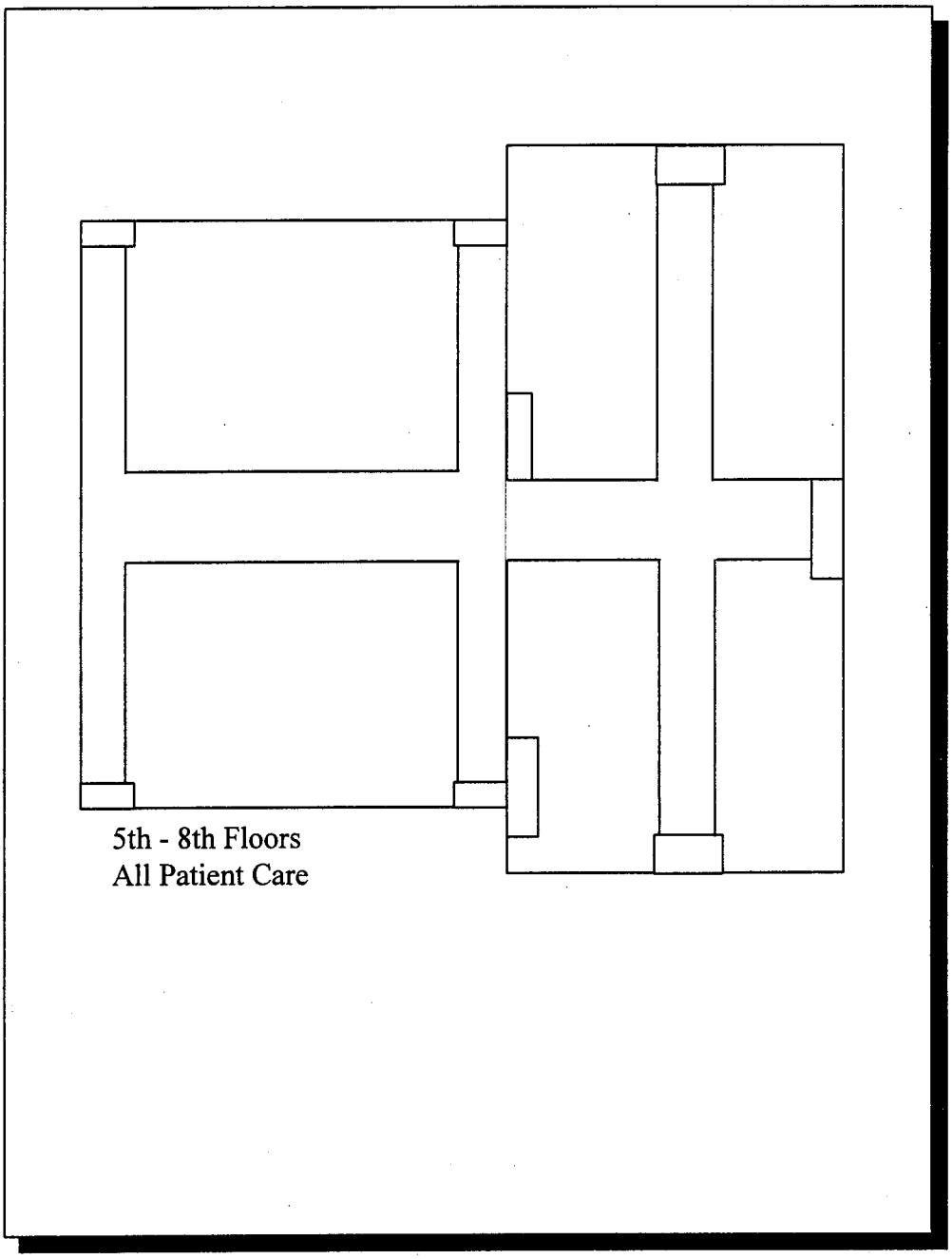
The hospital is only partially sprinklered, but complies with all life safety code requirements for smoke, heat, and fire alarm/detection systems.

The facility was constructed in 1971 using a basic building code.


4
5
Operating
Rooms
3
X-Ray
Burn
Unit
2
Hist.
G.I.
Labs
1
Hemo.
Tox.
ICU
CCU
2nd Floor


Cardiac
Catheter
Lab
Central
Supply
MRI
G.I.
Imaging
Nuclear
Medicine
CAT Scan
Imaging
Ultrasound
Imaging
3rd Floor


OB. GYN.
Pediatrics
Labor &
Delivery
Nursery
Med/Surg.
Wing
4th Floor


5th - 8th Floors
All Patient Care

Team Project--Part I

Scenario 2

Three primary substances are involved in this incident:

1. Allyl chloride.
2. Phosphorus pentasulfide.
3. Toluene diisocyanate.

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Team Project--Part II

Scenario 2: Container Data

All the containers involved in the incident are railcars. Specifically, there is a DOT 111J100W1, a DOT 103A60W1, and boxcars. There are multiple cars involved in this scenario.

Environmental Data

To the north end of Poplar Street is the West River Lake and Dam. The lake is the primary water supply for Westville. This area is also a recreational area which includes a park and fishing areas that are quite popular with residents. Particularly attractive are the rolling hills and woods on the north side of the park and lake. The community has a population of approximately 45,000.

There is a grade school located about 1 mile west of Poplar Street on 2nd Street. The high school is located 2 miles away at the southern edge of town on Walnut Street.

The soil has a relatively high sand content at the surface and generally rests on a limestone base.

The incident occurs on a Saturday in September. The temperature is expected to range from 68°F to 85°F. Humidity is expected to range from 68 percent to 92 percent. The skies will be sunny, hot, and hazy, with winds at 5 to 8 mph from the southwest.

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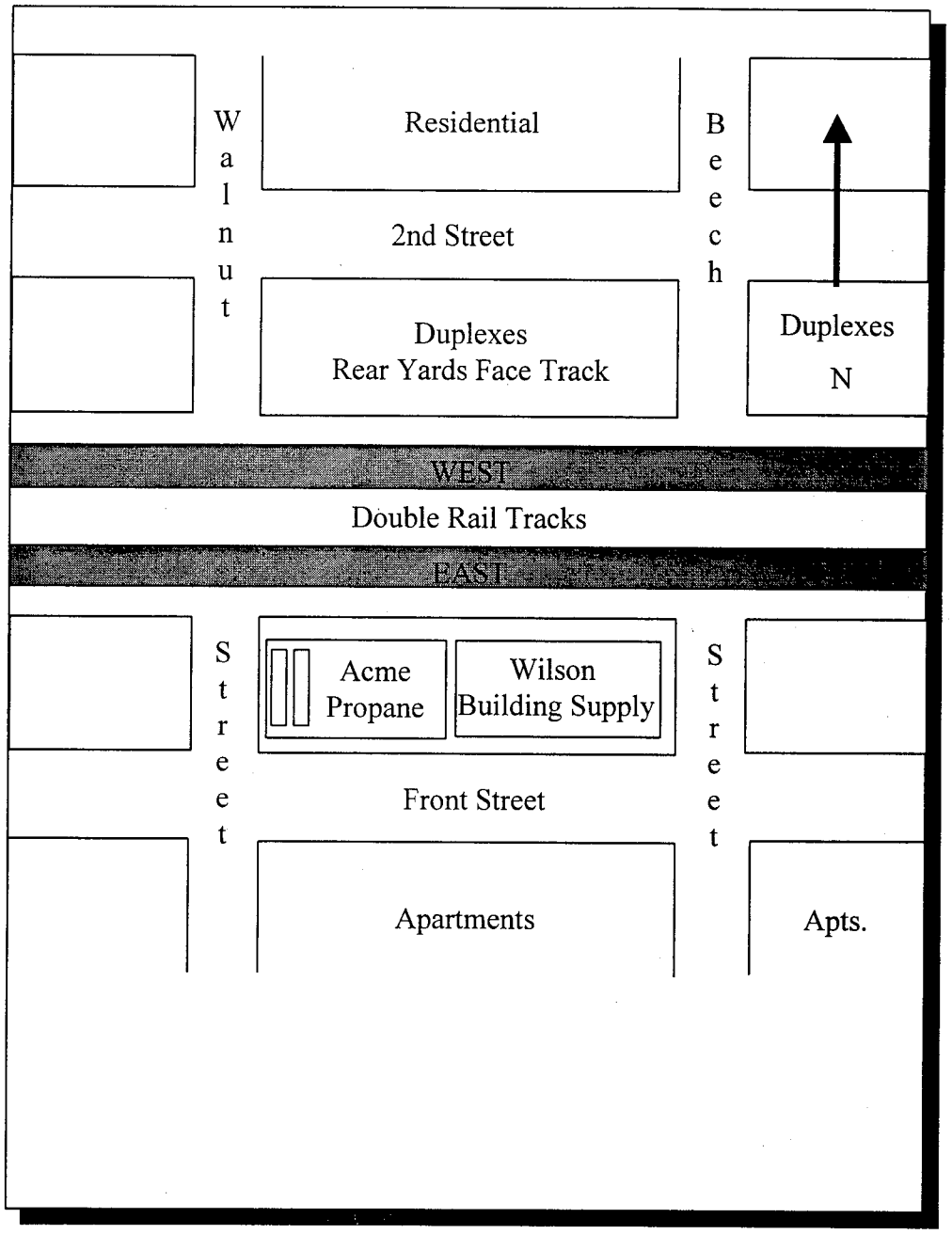
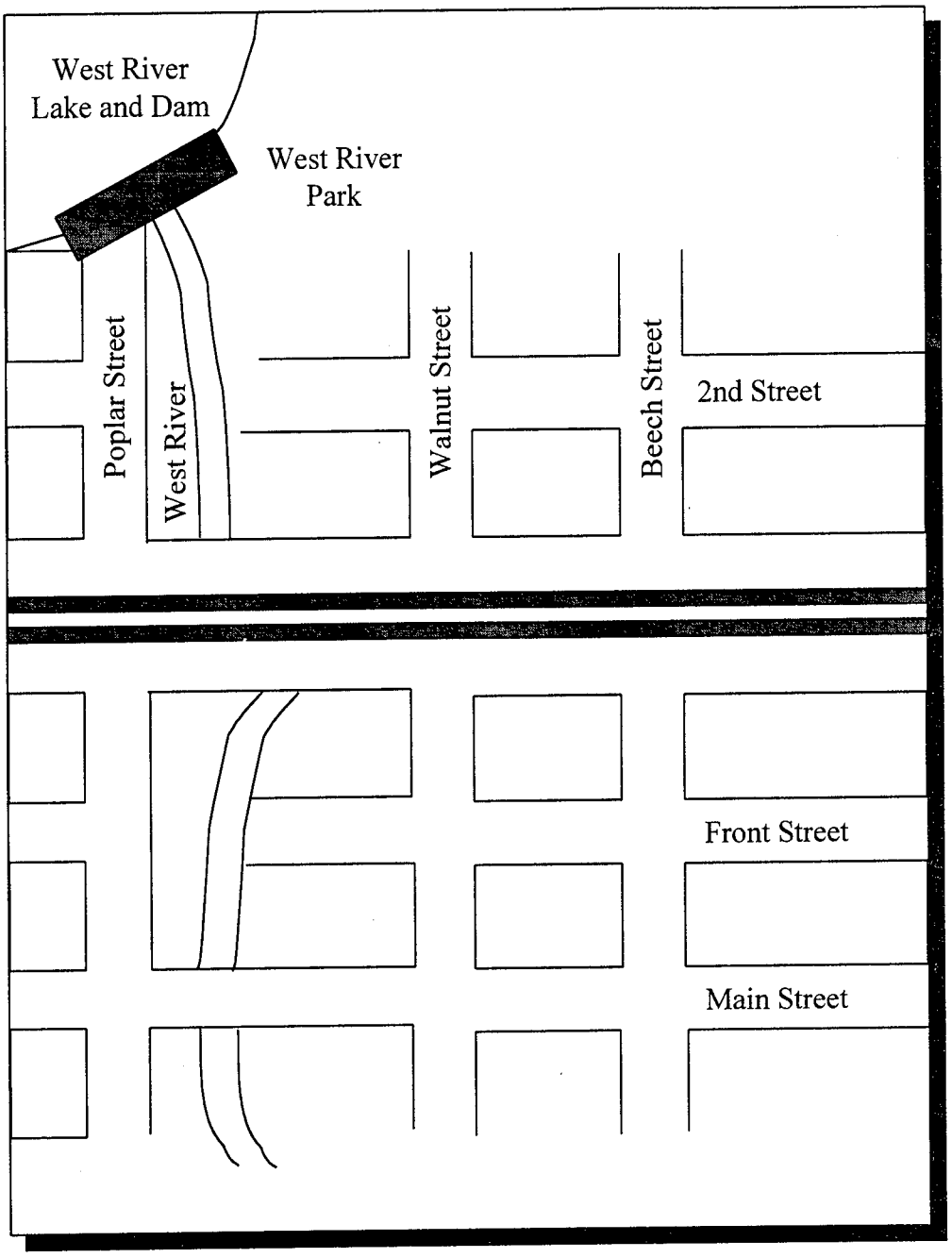

Walnut
Residential
Beech
2nd Street
Duplexes
Rear Yards Face Track
Duplexes
N
WEST
Double Rail Tracks
EAST
Street
Acme
Propane
Wilson
Building Supply
Street
Front Street
Apartments
Apts.


West River
Lake and Dam
West River
Park
Poplar Street
West River
Walnut Street
Beech Street
2nd Street
Front Street
Main Street

Team Project--Part I

Scenario 3

Three primary substances are involved in this incident:

1. Chlorine.
2. Chlorine dioxide.
3. Sodium hydroxide.

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Team Project--Part II

Scenario 3: Container Data

The vertical storage tanks are stainless steel, dome roof, low-pressure tanks with a fiberglass liner. Each tank has a 80,000-gallon water capacity. All three are manifolded together to provide product to the bleaching line of the pulp facility. Each tank has a 4-inch, spring-loaded, pressure-relief device with an attached vent stack.

The horizontal tanks are high-pressure steel tanks with 18,000-gallon water capacity. They are filled from the railroad cars on the siding next to the tanks. Each tank also has a spring-loaded, pressure-relief device and manifolded for supply to the facility through overhead piping to the digester.

Pipe bridges carry the piping systems to appropriate locations throughout the facility.

Environmental Data

D & L Paper and Pulp is a paper and pulp manufacturing facility that starts with wood chips and produces both finished paper and bleached pulp. It employs 600 workers and operates three shifts, 24 hours a day, 7 days a week.

Ace Chemical manufactures chlorine and chlorine salts. Most of its shipping takes place by rail, from a siding that runs from the facility directly through D & L Paper's facility. Ace employs 100 people and runs a 24-hour operation.

The area west of Main Street is residential consisting primarily of single-family dwellings with some duplexes. At 11th and Main Streets is the high school with approximately 1,200 students and faculty during school hours.

Immediately north of Ace Chemical is an area of light industrial occupancies.

The incident occurs at 0615 on a Monday in late June. The winds are calm with a temperature of 68°F, and a humidity of 89 percent.

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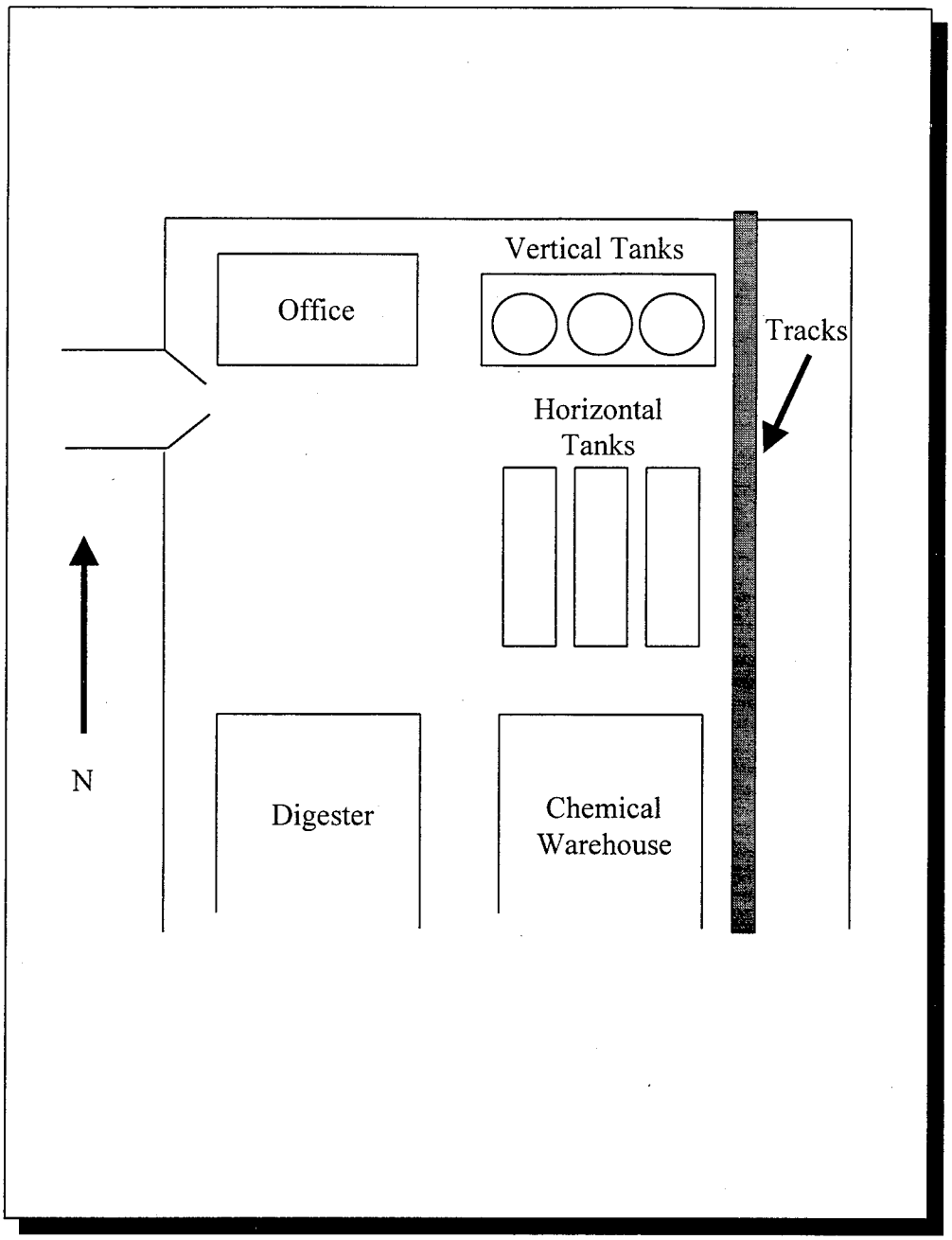
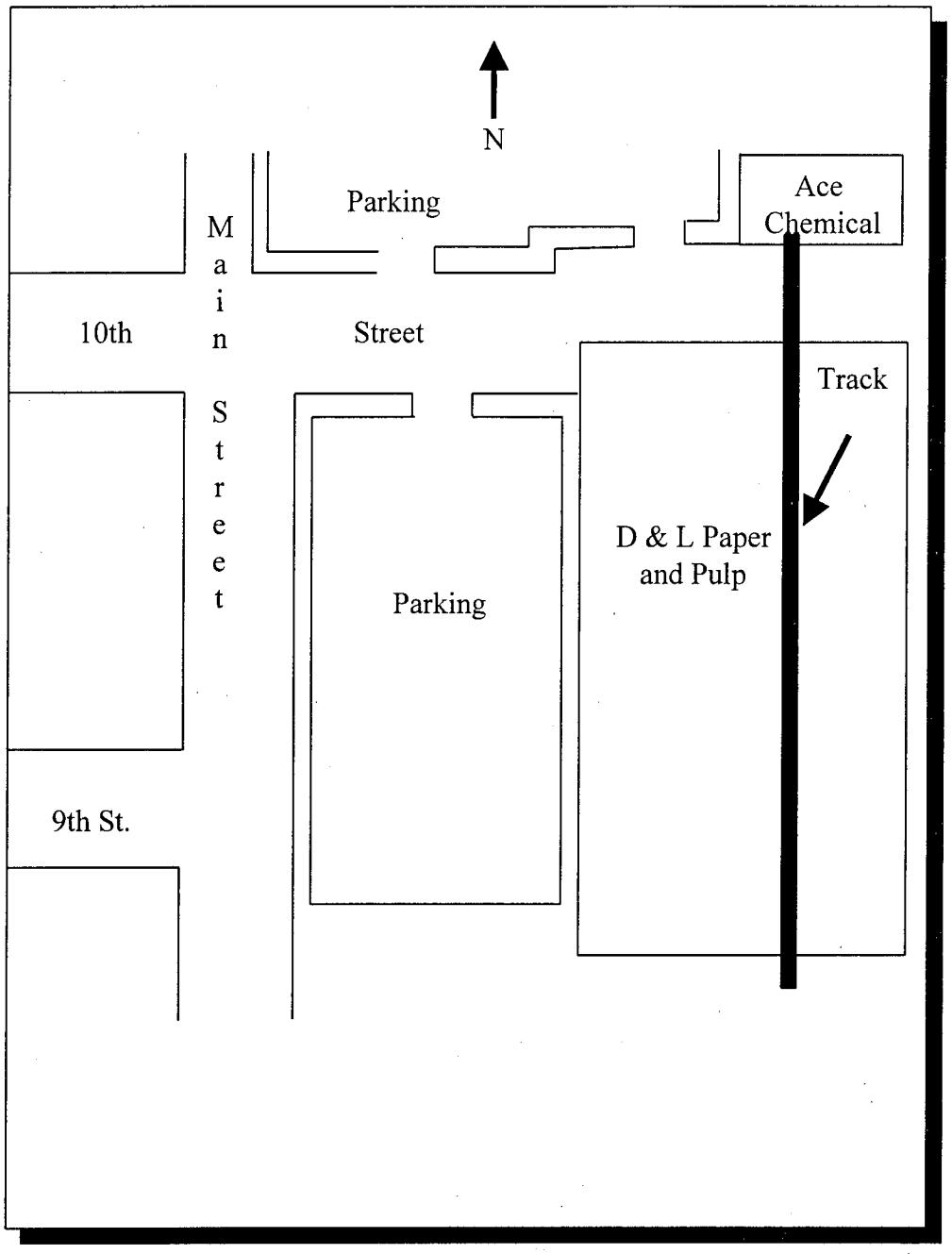

Vertical Tanks
Office
Tracks
Horizontal
Tanks
N
Digester
Chemical
Warehouse


N
Parking
Ace
Chemical
M
a
i
n
10th
Street
Track
S
t
r
e
e
t
D & L Paper
and Pulp
Parking
9th St.

Team Project--Part I

Scenario 4

Three primary substances are involved in this incident:

1. Ammonium hydroxide, 28 percent.
2. Epichlorohydrin.
3. Zinc powder.

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Team Project--Part II

Scenario 4: Container Data

One container involved in this incident is a DOT 407 SS cargo tank with a capacity of 40,000 pounds and 5,000 gallons. The other containers are nonbulk and intermediate bulk containers.

The nonbulk containers are marked UN 1G/Y1.5/100/94.

The intermediate bulk containers are marked UN 13H3/Y/0596/USA/LDM/0/1000

Environmental Data

This incident occurs in Eastville, an urban area where Interstate 222 crosses two major local roadways. Brookside Drive and Hamilton Boulevard are heavily traveled, four-lane highways with unlimited access. When traveling eastbound on I-222, one travels under the Brookside Drive interchange, which has exit and entrance ramps. Next, one travels on a bridge over the Scott River and another bridge over Hamilton Boulevard. The Scott River empties into the Great Scott River about a half mile south of the I-222 bridge. The Eastville Water Works (drinking water treatment facility) is approximately a half-mile east and downstream from this confluence.

In the immediate area surrounding these highways is a 400-unit condominium development known as the Fairways at Brookside. To the north of the Fairways and I-222 is Jana's Restaurant (a 150-table restaurant and lounge). On the west side of Brookside Drive are a series of strip malls and small commercial buildings, bordered to the west by high-density residential occupancies.

On the east side of the Scott River is Riverfront Park, part of the greenbelt that runs through downtown Eastville. To the east of Hamilton Boulevard are additional high-density residential occupancies.

This incident occurs on a Friday in June. The temperatures are expected to range from 58°F to 75°F. The humidity will range from 72 to 98 percent. The skies will be partially overcast, with light and variable winds (1 to 3 miles per hour) changing from the northeast to the southeast.

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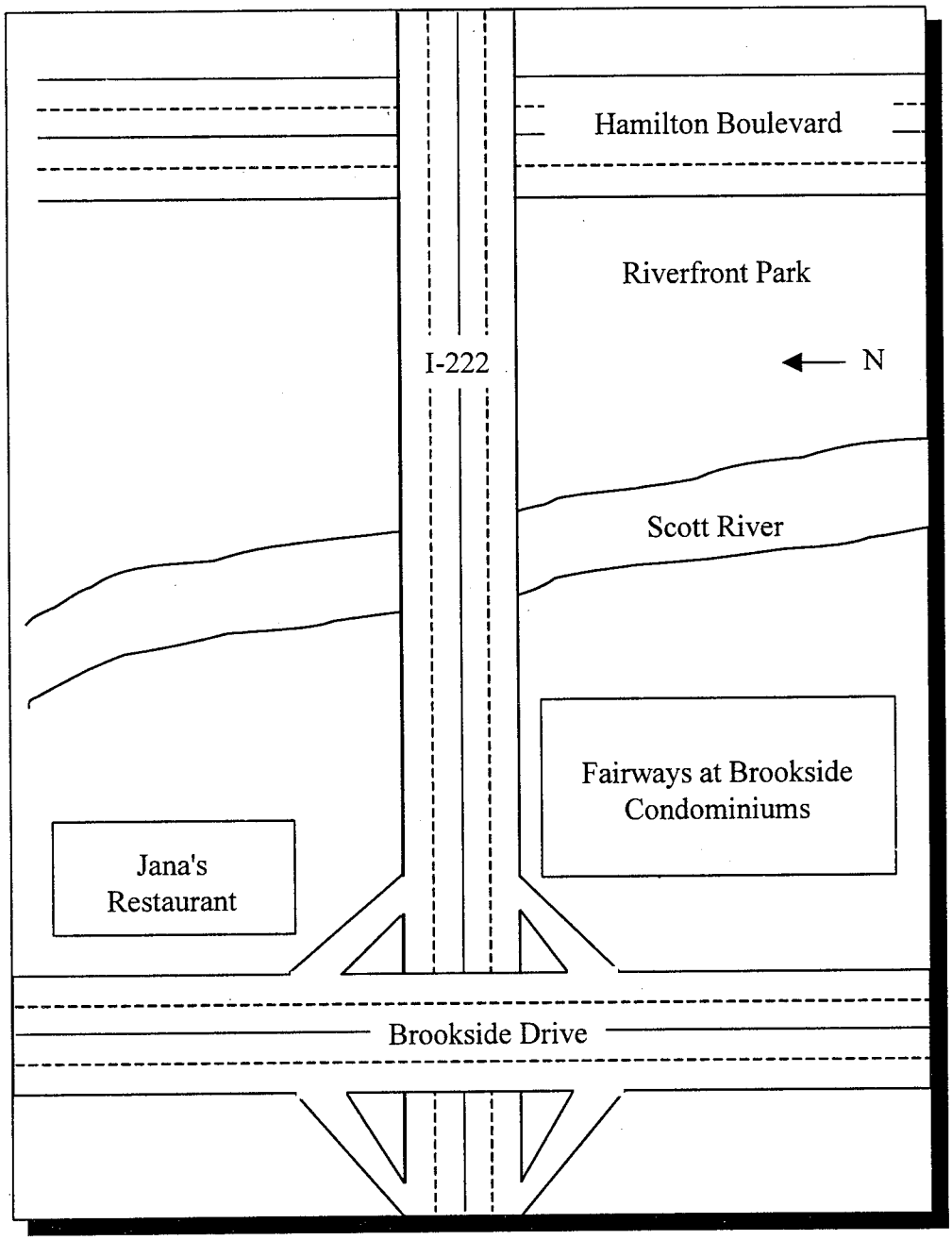

Hamilton Boulevard
Riverfront Park
I-222
N
Scott River
Fairways at Brookside Condominiums
Jana's Restaurant
Brookside Drive

Team Project--Part III

Scenario 1

At 1500 hours on a Thursday in April, a heating/ventilating/air conditioning (HVAC) contractor started working on increasing the flow rate in the histology lab on the second floor. The contract personnel were using a portable ladder to gain access to the duct work located above the ceiling. One of the workers was on the ladder attempting to disconnect a piece of ductwork when the base of the ladder kicked out. The contractor and the ladder started to fall. As both fell, they struck a chemical storage cabinet and a bench containing chemicals. The contractor, ladder, storage cabinet, and a mixture of chemicals wound up on the floor. In the process of falling, a water line broke, and started an open-ended flow of water onto the floor.

The contractor's partner immediately rushed to the aid of his coworker. The worker who fell sustained relatively minor bruises, cuts, scrapes, and a sprained ankle. Both personnel received chemical contamination. As they exited the lab, a pool of liquid was forming on the floor of the lab. They proceeded down the hall toward the Burn Unit and exited down the fire tower that leads to the Trauma Center below.

At the time of the incident, Operating Room 3 was in use. The operation started at about 1430 hours and would continue until at least 1800 hours. O.R.'s 2,4, and 5 were occupied at the time of the fall, but staff was able to complete the procedures by 1530.

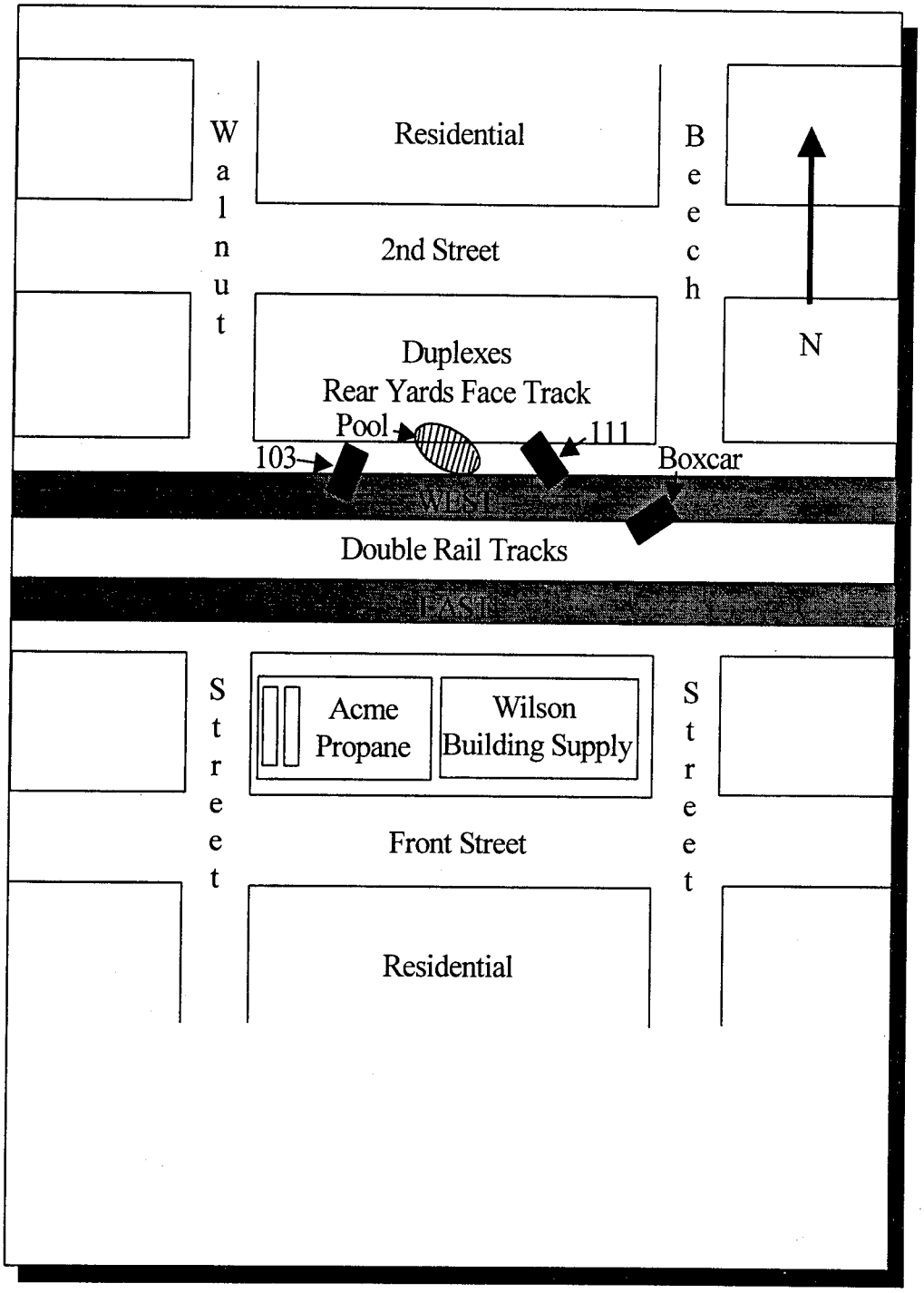
Upon arrival, first units find a strong, irritating odor spreading throughout the lab and hallway area on the second floor. The injured and contaminated contractors have left for the emergency room.

Scenario 2

At 1100 hours on the Saturday before Labor Day a 104-car train of the R & R Railroad was heading west at about 45 miles per hour on the Reading Line running through Westville. About two blocks east of the Beech Street crossing, the engineer noticed an unusual vibration, and shortly thereafter the train lurched to the left. At that point, emergency indicators came on and the engineer started emergency braking. Looking back along the train, the engineer saw that a major derailment had occurred. At least 8 to 10 cars had left the track, rolled, and piled up, like an accordion. These cars included box, flats, and tank cars. Several other cars derailed but did not roll.

First units on the scene reported the above information and also indicated that one of the flats, a 90-foot car-carrier, had smashed into one of the buildings at Wilson Building Supply and caused a partial structural collapse. A tank car placarded flammable liquid with (DOT III) the UN ID number of 1100 appears to have rolled over about 90 degrees, releasing product from the manway. The product is pooling at the side of the track (10' x 35') and is burning. Slightly farther back in the pile is a placarded boxcar with an ID number of 1340. It is not presently on fire. Just in front of the burning car is a placarded tank car (DOT 103) with the ID number of 2078.

Upon arrival, you find that the derailment located along the tracks behind both Acme Propane and Wilson Building Supply. There are at least five or six nonplacarded tank cars and several nonplacarded boxcars in the pile. The fire presently involves liquid on the ground. The liquid is flowing to the west in a downgrade direction on the north side of the tracks.


Residential
Walnut
Beech
2nd Street
N
Duplexes
Rear Yards Face Track
Pool
111
103
Boxcar
WEST
Double Rail Tracks
EAST
Acme
Propane
Wilson
Building Supply
Street
Street
Front Street
Residential

Scenario 3

At 0300 hours on a Monday in late June, personnel of the D & L Paper and Pulp Company opened a mechanical transfer valve for chlorine dioxide tank 2 (the middle of the three vertical storage tanks) to pump product into the manifold system. After about 5 minutes of flow, an explosion occurred. As personnel ran to find out what happened, a cloud was seen forming inside the dike area. There is an emergency shutoff for the chlorine dioxide tanks on the east wall of the office building.

Closer inspection found an employee down just outside the dike almost directly south of tank 2. A section of 4-inch piping, about 3 feet downstream from the tank shutoff valve split longitudinally to a point about 6 feet from the manifold for all three tanks. There is a heavy flow of product coming from the pipe, and a pool of product is forming within the dike. Conditions deteriorated rapidly in the area, and company personnel had to flee the area.

Upon arrival, units report a growing vapor cloud in the northeast corner of the facility. Two other company crews had also been unloading a boxcar of sodium hydroxide and a tank car of chlorine. The tank car personnel had to evacuate the area before stopping the product offloading process.

The chlorine car is directly connected to the horizontal fixed storage tanks next to the siding. The tanks have spring-loaded pressure relief devices. The piping leaves the storage area and proceeds to the digesters in overhead piping.

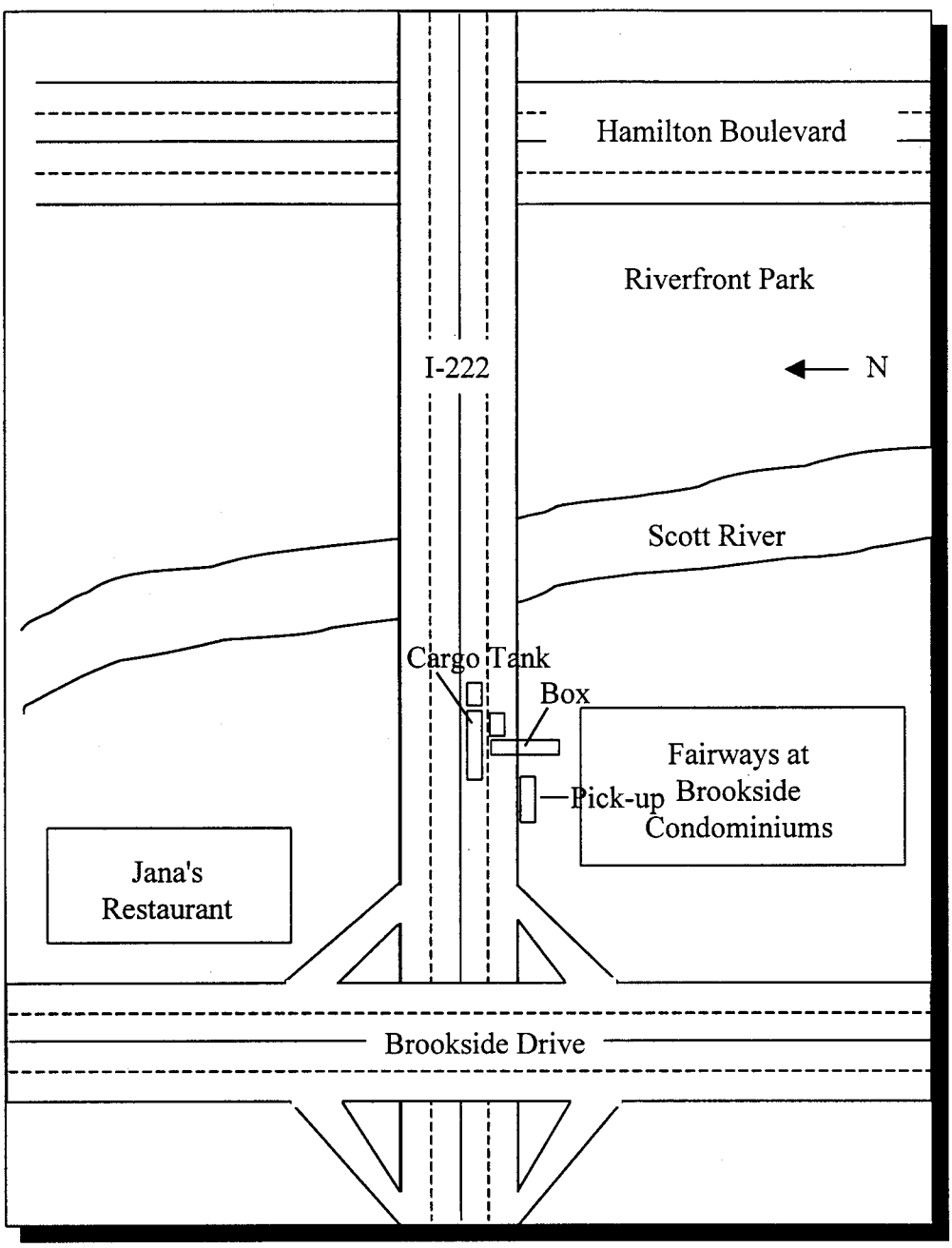
Scenario 4

At about 0530 Friday morning, a DOT 407 cargo tank hauling epichlorohydrin (UN 2023) was heading east on I-222 in the left hand lane. The cargo tank started passing a 45-foot, straight box trailer as they approached the Brookside Drive overpass. A pick-up truck entering eastbound I-222 from northbound Brookside did not yield to the box trailer. As the tractor of the box trailer slammed into the pick-up, the rig lurched to the left and struck the cargo tank. Both rigs skidded to the left, the cargo tank rolled onto its left side, and the nose of the tank struck and slid along the 4-foot concrete median barrier. At the same time, the box trailer jack-knifed and one rear cargo door swung open.

The cargo tank and box trailer came to rest in a pile just west of the Scott River Bridge. There were 10, UN 1G (with corrosive label and UN 2672) and 4, UN 13H3 and UN 1436 containers in the box at the time of the accident. The UN 13H3 had labels indicating "dangerous when wet and spontaneously combustible". Four of the 1G containers fell as the box trailer swung around and now are lying on the highway.

First-arriving units reported severe damage to the pick-up truck sitting on the shoulder. The driver of the box trailer appears trapped in her cab. The drivers of the pick-up and cargo tank have extricated themselves and have moderate injuries. The cargo tank driver has his shipping papers, but the box trailer's papers are still in the cab with the driver. There is a small pool of liquid (10 x 15 feet) forming at the front of the cargo tank's tractor, and there are several small pools of liquid surrounding each of the 1G containers that have fallen from the box. There is an ammonia-like odor in the area. There are also various liquids on the ground around the tractor of the box trailer.

The temperature is 58°F, and the humidity is 98 percent. The skies are partially overcast, with light and variable winds (1 to 3 miles per hour) changing from the northeast to the southeast.


Hamilton Boulevard
Riverfront Park
I-222
N
Scott River
Cargo Tank
Box
Fairways at
Brookside
Condominiums
Pick-up
Jana's
Restaurant
Brookside Drive

Team Project--Part IV

This is the final part of the Team Project and it involves separate steps. In step one, each team will have 90 minutes to complete the Plan of Action (POA) sheets found on the following pages. At that time, each team will turn in its POA to the instructor.

Make sure that you address each goal and that you identify the specific tactics used to meet the goal. If you take a specific approach to a goal, **make sure** that the tactics fit the goal. There are several potential options for each goal. As such, it is not as important which specific goal you choose but **why you choose it**. Its tactics must be appropriate.

The second step of Part IV is an oral presentation to the class. **Each** member of the team will present a portion of the report. Address the following areas:

1. A synopsis of information regarding the product, container, and environment.

2. An estimate of the potential course and harm of the incident.

3. A rundown of the POA identifying each goal and the corresponding tactical objectives and, if possible, methods for each.

To prepare its team project presentation, each team may take the remainder of the morning to complete its plan of action. Prepare one sheet for each strategic goal. Under each goal, identify the specific tactical objective the team would employ. Include a brief explanation of the tactical methodology selected.

The instructor will lend each team a set of overheads for each scenario for use in the presentation. Clean all overheads and return them to the instructor after the presentation. Provide a copy of the team's strategy and tactic sheets to each instructor prior to the presentation.

Examples of completed strategy and tactic sheets follow on the next pages.

Each team will have 20 minutes to present its scenario. After the presentation is complete, the other teams may ask questions or raise concerns. When the teams are finished, the instructors may ask any further questions.

Team Project--Part IV

Example 1

Plan of Action

Group _____ Scenario Number_____

Strategic Goal: *Isolation*

Tactics:

1. *Establish perimeter -Make sure first responders established a*
2. *perimeter between 11th and 12th Streets from*
3. *Oak to Pine Streets.*
4. *Establish zones - Hot zone will be established 500 feet from the truck.*
5. *Initial isolation Evacuate downwind .1 mile and protect in-place to*
6. *.3 mile downwind.*

Example 2

Group _____ Scenario Number_____

Strategic Goal: *Spill Control*

Tactics:

1. *gas/air release*
2. *Ventilate - Use PPV by pressurizing the processing/packaging and*
3. *shipping areas.*
4. *Dissolution Use a master stream to the rear of the structure to*
5. *dissolve and help dissipate the water-soluble vapors.*
6. *liquid/surface release*
7. *Adsorb - Use adsorbent material to adsorb residual liquid on the floor*
8. *and to help suppress the vapors.*

Example 3

Group _____ Scenario Number_____

Strategic Goal: *Notification*

Tactics:

1. *Request assistance - Assure that police, EMS, mutual aid, and LEPC*
2. *are notified*
3. *Notify state EPA, health department, emergency management, and*
4. *state police.*
5. *Request information- Contact CHEMTREC, NRC, shipper, manufacturer,*
6. *and LEPC for additional information on the*
7. *product, container, and the facility.*

Team Project

Plan of Action

Group_____ Scenario Number_1_____

Strategic Goal:_____

Tactics:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

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Team Project

Plan of Action

Group_____ Scenario Number_1_____

Strategic Goal:_____

Tactics:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

Team Project

Plan of Action

Group_____ Scenario Number_1_____

Strategic Goal:_____

Tactics:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

Team Project

Plan of Action

Group_____ Scenario Number 1_____

Strategic Goal:_____

Tactics:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

Product Data Sheet --- Science Group

Incident Number ___/___/___/___ Preparer: _____
year/month/day/number
Science Officer: _____
Additional Science Personnel: _____
_____

Responders must complete a sheet for each product involved.

PRODUCT

Name: _____
Alternate Name(s): _____
Chemical Formula: _____
[ ] Structural _____
[ ] Empirical _____

IDENTIFICATION NUMBERS

UN Class/Division _____ UN Identification _____ CAS _____
STCC _____ EPA Registration _____ EPA Establishment _____

NFPA 704 DESIGNATION

[ ] Health _____ [ ] Flammability _____
[ ] Reactivity _____ [ ] Special Hazards _____

HAZARD COMMUNICATIONS/HMIS DESIGNATION

[ ] Health _____ [ ] Flammability _____
[ ] Reactivity _____ [ ] Special Hazards _____

RELEASE STATUS

[ ] No release [ ] Ongoing release [ ] Complete release
[ ] Anticipated release [ ] Unknown

QUANTITY

Reportable quantity (RQ) _____ Released quantity _____
Available for release _____

FLAMMABILITY PROPERTIES

Reference Sources	1. Pg.	2. Pg.	3. Pg.
LEL			
UEL			
Flash point			
Ignition temperature			
Decomposition (State yes or no)			
Explosion potential			

PHYSICAL PROPERTIES

Reference Sources	1. Pg.	2. Pg.	3. Pg.
Odor			
Odor threshold			
Color			
Physical state			
Physical form [ ] Particulate [ ] Granule [ ] Slurry/gel [ ] Cryogenic [ ] Liquefied compressed gas			
Boiling and condensation point			
Freezing and melting point			
Sublimation (State yes or no)			
Specific gravity			
Vapor density			
Vapor pressure			
Reid vapor pressure			
Water solubility			

REACTIVITY PROPERTIES

Reference Sources	1. Pg.	2. Pg.	3. Pg.
Oxydizer (State yes or no)			
Pyrophoric (State yes or no)			
Corrosive (State yes or no)			
pH anticipated			
MSST			
SADT			
Explosion potential (State yes or no)			
Polymerization potential. (State yes or no)			
Radioactivity [ ] Alpha [ ] Beta [ ] Gamma [ ] Other			

TOXICITY

Reference Sources	1. Pg.	2. Pg.	3. Pg.
TLV			
PEL			
IDLH			
STEL			
Ceiling			
LD_{50}			
LC_{50}			
Exposure routes (i) Inhalation (d) Ingestion (s) Skin abs./cont.			
Carcinogen (State yes or no)			
Mutagen (State yes or no)			
Teratogen (State yes or no)			
Target organs			
Symptoms of exposure			

First aid			

Reference Sources	1. Pg.	2. Pg.	3. Pg.
Compatibilities			
PPE			
Substances			
Incompatibilities			
PPE			
Substances			

PROTECTION DISTANCES

Isolation _____

Small quantity _____

Large quantity _____

Evacuation _____

Small quantity _____

Large quantity _____

MONITORING DATA

Anticipated atmosphere hazards

[ ] Oxidizer
[ ] Corrosive
[ ] Toxic
[ ] Oxygen deficient
[ ] Radiation
[ ] Oxygen enriched
[ ] Flammable

Relative Response Conversion Factors: _____
Substance Ionization Potential: _____ e.V.

MONITORING FACTORS

Relative response	R.R. factor	Source:
Ionization potential	I.P.:	Source:
Action levels (based on relative response)	10% LEL with R.R. factor	Source:
Minimum O_2 function level	20% LEL with R.R. factor	Source:

INSTRUMENTATION

Instrument	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time	Reading/ time
CGI							
$\%O_2$							
pH paper							
Colorimetric tubes (name)							
Tube 1							
Tube 2							
Tube 3							
Dip stick (name)							
Radiation (specify)							
PID							
FID							

CONTAINER DATA

Responders need to complete separate forms for each container involved.

PORTABLE [ ]

Nonbulk (less than 119 gal./882 lbs. capacity)

[ ] bag [ ] bottle/jar [ ] box

[ ] drum

[ ] fiber [ ] steel [ ] stainless steel

[ ] plastic [ ] 35 gal. [ ] 55 gal.

[ ] cylinder

[ ] liquefied compressed gas [ ] compressed gas

[ ]

Bulk

[ ] large container (tote, del, etc.)

[ ] intermodal

[ ] container/CIFC [ ] trailer/TOFC

[ ] IM 101 [ ] IM 102

[ ] SPEC 51

Capacity: gallons_____ pounds _____ cubic feet_____

FIXED CONTAINER [ ]

Atmospheric

[ ] fixed/cone roof [ ] floating roof

[ ] internal floater [ ] retrofit floater

Low pressure

[ ] dome roof

High pressure

[ ] horizontal pressure [ ] pressure sphere

[ ] reactor/process vessel

Other: _____

_____

Preceding page blank

TRANSPORTATION

(Check off the appropriate category and complete its section below.)

[ ] Highway [ ] Rail [ ] Air [ ] Water [ ] Pipeline

Highway

[ ] box [ ] van [ ] refrigerated
[ ] flatbed [ ] dry bulk

[ ] MC306/DOT406 [ ] MC307/DOT407
[ ] MC312/DOT412 [ ] MC331 [ ] MC338
[ ] tube trailer

Rail

[ ] flat [ ] box [ ] hopper/gondola
[ ] dry bulk [ ] tube

Tank car

non-pressure (low pressure)
[ ] DOT 103 [ ] DOT 104 [ ] DOT111
pressure
[ ] DOT 105 [ ] DOT 112 [ ] DOT 114
miscellaneous
[ ] DOT 113 [ ] DOT 115 [ ] OT 106
[ ] DOT 109 [ ] DOT 110

Other:_____

Air

[ ] passenger craft [ ] cargo craft

Water

ship: [ ] tanker [ ] container [ ] bulk cargo

Other: _____

barge: [ ] liquid [ ] liquefied gas [ ] dry bulk

Other: _____

Pipeline

[ ] liquid [ ] gas [ ] slurry

CONTAINER PRESSURE

[ ] atmospheric [ ] low [ ] high [ ] ultra-high

RELIEF DEVICES

[ ] none [ ] spring loaded [ ] rupture disk [ ] fusible plug/link

CONSTRUCTION MATERIALS

Nonmetallic

[ ] paper [ ] cardboard [ ] wood [ ] glass [ ] plastic

Metallic

[ ] aluminum (Al) [ ] standard steel

For rail and high pressure metals

[ ] high temper low alloy (HTLA)
[ ] quench-tempered (QT)
[ ] brittle steel (pre-1966/515-B and 212-B. Use 2 in minimum radius for rail.)
[ ] ductile steel (post-1966/TC-128. Use 4 in minimum radius for rail.
[ ] stainless steel (SS)

COMPARTMENTS

[ ] yes number _____
[ ] no
Capacity and arrangement of each compartment

CODES OF CONSTRUCTION

[ ]49 CFR [ ] NFPA Page: _____ Section: _____

SPECIFICATION MATERIAL THICKNESS

[ ] wall/shell/barrel [ ] head

WEIGHT

Gross: _____ Tare: _____

CONTAINER DATA SHEET

DAMAGE ASSESSMENT

TEMPERATURE

ambient _____ forecasted _____ product _____ container _____

PRESSURES

container design _____ container test _____ adjusted test _____ internal _____

STRESSORS

Thermal: [ ] radiant [ ] impingement [ ] chemical
Chemical: [ ] corrosive [ ] acid [ ] base
[ ] oxidation [ ] substance expansion
[ ] reaction Type: _____
Mechanical: [ ] impact [ ] friction [ ] pressure
Pressure sources: _____
_____
Radiation [ ]

TYPE AND DEGREE OF DAMAGE

Damage
[ ] thermal [ ] deformative [ ] expansive
[ ] dents [ ] burns [ ] scores [ ] gouges

Additional information:
_____
_____
_____

rail and pressure: dent radius: _____ dent depth: _____

Breach location
[ ] openings [ ] shell/wall [ ] piping
[ ] valving/attachments [ ] relief devices

Additional information:
_____
_____

Preceding page blank

Type and degree

[ ] corrosion [ ] thermal burn-through
[ ] pin-hole [ ] split or tear
[ ] crack [ ] complete failure

Additional information:

_____

_____

_____

Depth on rail and pressure containers

[ ] 1/16" (little damage) [ ] 1/8" (product transfer) [ ] ¼" (critical)

CONTAINER COMPROMISE

Is the structural Integrity presently compromised? [ ] yes [ ] no

If so, by which stressor? [ ] thermal [ ] chemical [ ] mechanical

Is it possible structural Integrity may become compromised? [ ] yes [ ] no

If so, by which stressor? [ ] thermal [ ] chemical [ ] mechanical

NET THICKNESS = container thickness <u>minus</u> the depth of the damage

Specification thickness:_____ Damage thickness:_____

Is the net thickness less than the specification thickness?
[ ] yes [ ] no

Rail and pressure containers

[ ] container is critical [ ] container is not critical

If the container is critical, immediately consider tactical options.

ENVIRONMENTAL DATA SHEETS

BASIC INCIDENT INFORMATION

Location: _____
_____
_____

Occupancy or transportation type: _____

Date: _____ Initial time (in military hours):_____

Updated times: _____ _____ _____ _____ _____
_____ _____ _____ _____ _____

Situation Status (upon arrival)

Spill (release): [ ] yes [ ] no
Contaminant: [ ] solid [ ] liquid [ ] gas
Size of contaminated area: _____
Fire present: [ ] yes [ ] no
Fuel: [ ] product [ ] container [ ] exposures
Explosion: [ ] yes [ ] no
Status: [ ] ongoing [ ] occurred
Other Information: _____
_____
_____

CONFINEMENT

[ ] Within a structure [ ] Outside
Devices: [ ] dikes [ ] retention pond [ ] detention pond
[ ] retention tanks
[ ] other _____
_____

CONDUITS

[ ] drainage ditch/swale [ ] storm sewers [ ] gullies

EXPOSURES

Population types/numbers

[ ] involved/estimated no. _____ [ ] contaminated/estimated no. _____
[ ] injured/estimated no. _____ [ ] trapped/estimated no. _____

Populations/occupancies endangered

[ ] residential [ ] commercial [ ] mercantile
[ ] industrial [ ] mixed [ ] hospital
[ ] nursing home [ ] school [ ] prison
[ ] transportation corridor

Other: _____
_____

STRUCTURE and PROPERTY TYPES

Man-made

[ ] structures [ ] processes [ ] containers
[ ] vehicles [ ] water wells [ ] sewage treatment
[ ] closed water storage/treatment
[ ] food production/handling facilities
Other: _____
_____

Natural

Bodies of water

[ ] stream [ ] river [ ] pond [ ] lake
[ ] open reservoir [ ] wetlands [ ] estuary
[ ] ground water

Surfaces

[ ] sand [ ] gravel [ ] clay [ ] compacted ground
[ ] asphalt [ ] concrete

Organisms

Animal

[ ] mammals [ ] fish [ ] birds
[ ] endangered species [ ] farm animals
[ ] dead animals/plants

Plant

[ ] agricultural [ ] aquatic

WEATHER

Responders should take meteorological readings every fifteen minutes. In critical situations, they may need readings at more frequent intervals. In non-critical situations, the intervals may be longer.

On-scene Weather Station

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

NOAA Information

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

Other Source: _____

Time								
Temperature								
Humidity								
Dew point								
Wind direction								
Wind speed								
Barometric pressure								

ESTIMATING INCIDENT COURSE AND HARM

SPILL

Status: [ ] Present [ ] Possible [ ] Anticipated
Type: [ ] Gas/Air [ ] Liquid/Surface [ ] Liquid/Water [ ] Solid/Surface

Anticipated spread_____

_____

Anticipated impact

On responders _____

_____

On victims_____

_____

On the public_____

_____

On exposures

[ ] structures [ ] other containers [ ] other substances
[ ] production processes [ ] animals [ ] vegetation

LEAK

Status: [ ] Present [ ] Possible [ ] Anticipated
Type: _____

[ ] Anticipated

Course: [ ] remain static [ ] expand [ ] container failure
Failure: [ ] explosive [ ] violent [ ] non-violent

[ ] Not anticipated

Anticipated harm of failure

To responders: _____

_____

To the public: _____

_____

To other containers: _____

_____

To other exposures: _____

_____

Preceding page blank

FIRE

Status: [ ] Present [ ] Possible [ ] Anticipated
Possible ignition sources: _____

Anticipated course

[ ] remain static [ ] spread to exposures [ ] intensify
[ ] result in explosion(s)

Anticipated harm of controlled burn

[ ] highly contaminated smoke [ ] possible explosion(s)
[ ] threaten exposures

Anticipated harm of controlled burn

To responders: _____
_____
To the public: _____
_____
To other containers: _____
_____
To other exposures: _____
_____

Anticipated harm of suppression

[ ] highly contaminated smoke [ ] contaminated run-off
[ ] mixing of substances [ ] water reactions [ ] explosions

Contamination spread to

[ ] responders [ ] the public [ ] structures
[ ] surface water [ ] animals [ ] plants

Anticipated harm of suppression

On responders: _____
_____
On the public: _____
_____
On other containers: _____
_____
On other substances: _____
_____
On other exposures: _____
_____

STRATEGIC GOAL SHEET

ISOLATION TACTICAL OBJECTIVES

[ ] Establish a perimeter [ ] Establish zones [ ] Conduct initial evacuation
[ ] Protect in place [ ] Withdraw

Comments _____

NOTIFICATION TACTICAL OBJECTIVES

[ ] Establish communications
[ ] Notify other agencies
[ ] Local response agencies [ ] Local support agencies
[ ] State agencies [ ] Federal agencies
[ ] Chemtrec [ ] National Response Center
[ ] Shipper [ ] Carrier [ ] Manufacturer

Comments _____

IDENTIFICATION TACTICAL OBJECTIVES

[ ] Distant visual inspection (binoculars) [ ] Shipping papers
[ ] Interviews [ ] Reconnaissance

Comments _____

PROTECTION TACTICAL OBJECTIVES

[ ] Evacuation [ ] Emergency medical services [ ] Decontamination
[ ] Rescue [ ] Monitoring [ ] Protection in place
[ ] Use of PPE

Comments _____

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SPILL CONTROL TACTICAL OBJECTIVES

Gas/air spill
[ ] disperse [ ] divert [ ] absorb [ ] ventilate [ ] blanket

Liquid-surface spill
[ ] dike [ ] divert [ ] absorb/adsorb [ ] retain [ ] solidy

Liquid/water spill
[ ] boom [ ] dam [ ] absorb/adsorb [ ] divert

Solid/surface spill
[ ] blanket

Comments _____

LEAK CONTROL TACTICAL OBJECTIVES

Type of leak: _____

Direct
[ ] Plug [ ] Patch [ ] Overpack [ ] Displace [ ] Reduce pressure

Indirect
[ ] Shut off remotely [ ] Transfer product

Comments _____

FIRE CONTROL TACTICAL OBJECTIVES

[ ] Exposure protection [ ] Personnel protection
[ ] Vapor suppression [ ] Fire suppression

Comments _____

RECOVERY AND TERMINATION TACTICAL OBJECTIVES

Recovery

[ ] Equipment decontamination [ ] Release of company(ies)
[ ] Cleanup oversight [ ] Waste labeling

Termination

[ ] Debrief hazcom [ ] Critique [ ] Prepare after-action report

Comments _____
_____
_____

SPILL CONTROL DATA SHEETS

PRODUCT CONSIDERATIONS

Physical state: [ ] solid [ ] liquid [ ] gas

Form:
[ ] compressed, liquefied gas
[ ] molten solid
[ ] powders, dusts
[ ] gel
[ ] cryogenic liquid
[ ] filings, shavings
[ ] slurry

Other _____

RELEASE CONSIDERATIONS

Status: [ ] none [ ] potential [ ] ongoing [ ] completed

Type: [ ] gas/air [ ] liquid/water [ ] liquid/surface [ ] solid/surface

TACTICAL OPTION CHOSEN

gas/air [ ] natural ventilation [ ] hydraulic ventilation [ ] mechanical ventilation**
**(If mechanical: [ ] house system [ ] positive pressure [ ] negative pressure)
[ ] diversion (change of direction)
[ ] dissipation (injection of air from fog streams or fan)
[ ] dissolution (use of water fog for water soluble gas or vapor)
[ ] blanketing (covering a liquid or solid to suppress vapors)

liquid/surface

[ ] diking Method _____

[ ] diverting Method _____

[ ] absorbing Method _____

[ ] adsorbing Method _____

[ ] neutralizing Method _____

Preceding page blank

[ ] gelling Method _____

[ ] solidifying Method _____

[ ] diluting Method _____

[ ] retaining Method _____

[ ] blanketing Method _____

[ ] emulsifying Method _____

liquid/water

[ ] damming Method _____

[ ] absorbing Method _____

[ ] booming Method _____

[ ] retaining Method _____

[ ] diverting Method _____

solid/surface

blanketing Method _____

LEAK CONTROL DATA SHEETS

LEAK TYPE

State and form of product _____

Container pressure _____

Container structural stability _____

Container physical stability _____

DIRECT CONTROL OPTION(S) CHOSEN

[ ] Plug method _____

_____

[ ] Patch method _____

_____

[ ] Crimp method _____

_____

[ ] Overpack method _____

_____

[ ] Shutoff method _____

_____

INDIRECT CONTROL OPTION(S) CHOSEN

[ ] Product transfer method _____

_____

[ ] Shutoff method _____

_____

[ ] Pressure reduction method _____

_____

[ ] Product displacement method _____

_____

OTHER OPTIONS

[ ] Flare method _____

_____

[ ] Vent and burn method _____

_____

FIRE CONTROL DATA SHEET

Fire

[ ] present [ ] possible [ ] not possible

Product Involved

[ ] explosive [ ] flammable liquid [ ] flammable solid
[ ] flammable gas [ ] radioactive [ ] pesticide
[ ] other _____
_____

Appropriate Extinguishing Agent

[ ] water [ ] foam [ ] dry chemical (ABC) [ ] dry powder
[ ] hazardous materials foam

Foam Type

[ ] protein [ ] fluoroprotein [ ] AFFF [ ] FFFP
[ ] polar solvent [ ] hazardous materials

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